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JANUARY

THE JOURNAL OF THE NATIONAL DENTAL ASSOCIATION

1922

One Hundred Per Cent Good Mouths —*Eyrich*

Merits of Our Principal Filling Materials —*Prime*

Surgical Management of Serious Focal Infection Cases—*Hardgrove*

Denture Economics—*Gillis*

The Alveolar Radiogram—*Pollia*

Orthodontia and Periodontia—*Stillman*

Effect of Diet Upon the Teeth and Jaws —*Howe*

Evolution of Porcelain—*Avary*

Child Psychology—*Burke*

Reminiscences of Forty-five Years in Dentistry—*Johnson*

The Budding Year—*Editorial*

Hotel and Railroad Information to the Los Angeles Meeting—*Editorial*

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MISS GLADYS EYRICH

Supervisor of Physical Education in the Public Schools of Jackson, Mississippi

THE JOURNAL

OF THE

National Dental Association

VOL. 9 JANUARY, 1922 NO. 1

Original Communications

ONE HUNDRED PER CENT GOOD MOUTHS—HOW OBTAINED IN THE PUBLIC SCHOOLS OF JACKSON, MISSISSIPPI

By GLADYS EYRICH, Supervisor, Jackson, Mississipi

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

HAS it ever occurred to you that thru your efforts it would be possible to have every child in the public schools of your community with a clean mouth? That this can be done where physical inspection is not provided by law? Where there are no facilities for the examination? Where there are no funds to back the work?

Four years ago the dentists in the little city where I teach had a vision of public service. Resolving that they would contribute their knowledge and skill toward improving the health of the future Mississippians, they offered their time to the Department of Physical Education for a dental examination. After four years of volunteer work, they are so astonished at the results of their self-sacrifice and labors and so convinced of the possibility of a similar result in each small city, town and rural community in the country that they have sent me as their representative to tell you of the work.

The dental inspection of 1917 was handled by volunteer work of eight local dentists. At that time two of the men worked together, one examining, the other recording. In this way it took two weeks to complete the work. We made the mistake that year of having the work too elaborate, making a diagnosis of each case, sending a copy home and keeping one on file. As this was found to be unwise, the next year we simplified the plan.

Each year since 1917, the second week

POWER SCHOOL, JACKSON, MISSISSIPPI, FIRST SCHOOL WITH 100 PER CENT GOOD MOUTHS ASSEMBLED AT STATE CAPITOL

after the schools open this volunteer examination takes place in the six white grammar schools. A regular schedule is made out, and a dentist goes with the supervisor of physical education to a school, carrying his disinfectants, alcohol lamp, mirror and any other instruments of a non-operative character. The school furnishes a table, a chair, a basin of water, two glasses, all placed near a window. The grade teacher brings her grade out in single file; the name of each pupil is on a sheet of theme paper in the same order in which he stands. This paper is divided into six columns: Cleaning, Extraction, Filling, Gums, O. K., Remarks. As the dentist calls a defect, it is marked with a cross (x), and when the examination is completed one can see at a glance all the work required in that grade. The examination takes about a half-minute or a minute for each child, depending on the condition of the mouth and the examiner, and each dentist gives about two hours of his time. The examination of six grammar schools, 1,674 pupils, took one week.

Each child who had no defects showing at the time of the inspection received a half-holiday. Thirty per cent of the children did not need attention, ranging from 13 per cent in one school to 50 per cent in another. Our first examination four years ago showed only two good mouths in our largest school. The two hundred high-school girls examined showed an increase of 300 per cent over last year's condition.

With the first monthly report a notice was sent to the parents as follows: "The mouth of your child has been examined. This notice is to inform you that certain dental work is necessary in order to preserve his teeth and health. You are advised to consult your dentist promptly. The school will appreciate a report of the action taken in this matter."

On my next visit to the school that was 50 per cent, I told the boys and girls that if they would get 100 per cent they could have a celebration; we would have a parade with a brass band, and we would have our picture taken and have banners and things! The principal said: "Now, boys and girls, of course you know that Miss Eyrich is going to every other school and say the same thing, so if you want to be the first 100 per cent school you will have to work!" As a matter of fact, I did not tell any of the other pupils this because no others had so high a percentage and at that time it had not occurred to me that they could be 100 per cent. But the largest school, Poindexter, nothing daunted that their average was only twenty-five, decided that they would race with Power School; each week on my visits the boys and girls would ask about the other school's rating. As the children had their teeth put in good condition, they brought certificates from the dentists; the teachers kept these on file for they established the daily average for the room.

As each room attained 100 per cent it had a holiday. Finally, on November 11, seven weeks after the campaign started, Power School had 100 per cent, and we had our parade. We had sixty-four automobiles filled with children, banners flying, horns blowing; we had our picture taken (p. 4); we went to the picture show.

On January 31, Poindexter School received its last certificate and we turned out for another parade, on foot this time, nearly five hundred strong. The banners bore significant slogans. One had "Acres of teeth but not an acher"; another, the smallest folks, "Little but not last," because they finished among the first; and the room that was last, the one that delayed the finish until January, had as its slogan: "We put Poindexter over the top!"

Of course, each school that reached

ASSEMBLED AT STATE CAPITOL

the goal, inspired the others to greater effort, and on March 20 our second largest school, Davis, having worked very children about this lovely invitation to a party which I had received because they had worked so hard, and asked the three

MISSISSIPPI STATE BOARD OF HEALTH

BUREAU OF CHILD WELFARE

TEETH RECORD

Name of School DAVIS Location GRADE 7 Teacher VARNADO

Name	Clean	Ext.	Fill	Gums	O.K.	Remarks					
Warren Black	—	—	—	—	★						
Edward Benson	X			X	★	Certificate	Dr.	J.H.	Cotten	Oct	3
Ira Downing	X	X			★	Certificate	Dr.	Ruth	May	Oct	1
Alma Fitzsimmons	—	—	—	—	★	Certificate	Dr.	W.R.	Wright	Sept	16"
Paul Tatom Fitzhugh	—	—	—	—	★						
John Hart Fowler	—	—	—	—	★	Certificate	Dr.	W.R.	Wright	Sept	17"
George Marshall	—	—	—	—	★	Certificate	Dr.	H.L.	Magee	Sept	23
William McMurtray	X				★	Certificate	Dr.	F.L.	Walker	Oct	3
George Miller	—	—	—	—	★						
Charles Patton	—	—	—	—	★						
W. L. Pierce			X		★	Certificate	Dr.	Ruth	May	Oct	10
Robert Rush	X				★	Certificate	Dr.	W.C.	Dennis	Oct	15"
Sidney Selerdge		X			★	Certificate	Dr.	J.A.	Cotten	Oct	7
Tom Smith	—	—	—	—	★	Certificate	Dr.	W.R.	Wright	Sept	27
Shirley Smith			X⊕		★	Certificate	Dr.	W.R.	Wright	Oct	3
Richard Stockett	—	—	—	—	★	Certificate	Dr.	W.R.	Wright	Sept	21"
Emmett Ward	—	—	—	—	★	Certificate	Dr.	E.C.	Mabry	Sept	16"
Frederick Whitehurst	—	—	—	—	★	Certificate	Dr.	W.R.	Wright	Sept	20"
Ford Williams					★	Certificate	Dr.	J.P.	Walker	Oct	1
Elizabeth Allen	—	—	—	—	★	Certificate	Dr.	W.R.	Wright	Sept	10"
Mathom Yerger Bowen	—	—	—	—	★	Certificate	Dr.	E.A.	May	Sept	26
Annie Lindsey Bush		X	X⊕		★	Certificate	Dr.	H.L.	Magee	Oct	8"
Ima Lee Cass	X		X⊕		★	Certificate	Dr.	J.B.	Labrie	Oct	10"
Lucy Tatom Fleming	X	X			★	Certificate	Dr.	B.J.	Leonard	Oct	10"
Lucian Fuller	X	X			★	Certificate	Dr.	B.F.	Leonard	Oct	1
Mary Frances Horn	—	—	—	—	★	Certificate	Dr.	J.H.	Cotten	Sept	15"
Helena Moore	—	—	—	—	★						
Edwina Neely	—	—	—	—	★	Certificate	Dr.	J.W.	Fowler	Sept	24"
Ruth Oliphant			X⊕		★	Certificate	Dr.	W.C.	Dennis	Oct	8"
Louise Patton		X			★	Certificate	Dr.	H.L.	Magee	Oct	8"
Ruby Grace Smith	—	—	—	—	★	Certificate	Dr.	E.C.	Mabry	Sept	23
Aubrey Shands	—	—	—	—	★	Certificate	Dr.	E.A.	May	Sept	26"
Maude Williams	—	—	—	—	★						

Dental chart of the seventh grade, Davis School, Miss Varnado, teacher. Examination September 29, 1921, showed that thirteen pupils needed work as indicated by crosses (x). Work completed October 15, 1921.

quietly all the time, attained its 100 per cent.

About this time, the Mississippi Dental Association invited me to be a speaker at the banquet on April 19. I told the schools which had not had all their mouths mended to make an extra effort so that the town could be 100 per cent by the time all these doctors arrived. Galloway School finished on April 14, Lee

on April 18, and George on April 19, so that I was the proud representative of 1,674 grammar-school children all of whom at some time since September had held a dental certificate.

One of the defects which we hope to remedy next year is to see that clean mouths are always kept clean. Nevertheless, we were astonished and gratified to discover that the grades which attained 100 per cent in 1919 had very little work necessary in the fall of 1920. In other words, the work done in children's mouths carries over in a more permanent

MISSISSIPPI STATE BOARD OF HEALTH

BUREAU OF CHILD WELFARE

TEETH RECORD

Name of School POWER Location GRADE 1 Teacher GREEN

Name	Clean	Ext	Fill	Gums	O.K.	Remarks	
Walter Geary	—	—	—	—	O.K.		Sept. 30
Grady Ivy Barron	—	—	—	—	O.K.		"
Odell Gould Gould			X		O.K.	Certificate	Sept. 24
Carmen Darby Farris	—	—	—	—	O.K.	Certificate	Sept. 1
Curran Lange		—	—	—	O.K.	certificate	Sept. 22
Gerald John S			X[D]		O.K.	Certificate	Oct. 4
Malcolm Eugene	—	—	—	—	O.K.	certificate	Sept. 19
Everett John Ben	—	—	—	—	O.K.	Certificate	Sept. 21
Cecil Richard					O.K.	Certificate	Oct. 3
Garner J B	—	—	—	—	O.K.	Certificate	Sept. 23
Sarah Stennel	—	—	—	—	O.K.	certificate	Sept. 27
Mary Lillie Robert	—	—	—	—	O.K.	certificate	Sept. 20
Robert Simmons	—	—	—	—	O.K.	certificate	Sept. 25
Ezell Jewell Williams	—	—	—	—	O.K.	certificate	Sept. 27
Frances Ezell	—	—	—	—	O.K.	certificate	Sept. 24
Fay Ivy Lucy	—	—	—	—	O.K.	certificate	Sept. 16
Hickey Raymond			X[D]		O.K.	Certificate	Sept. 30
Nathan Hale	—	—	—	—	O.K.	certificate	Sept. 14
Laurine Phelps					O.K.	Certificate	Oct. 4
Armstrong Cargill	X				O.K.	Certificate	Sept. 1
Alexander Julia	—	—	—	—	O.K.	Certificate	Sept. 27
Emery Lenora					O.K.	Certificate	Oct. 3
Bobbie Mary	—	—	—	—	O.K.		Sept. 30
Downing Emma	—	—	—	—	O.K.	certificate	Sept. 24
Lowery Bernice					O.K.	Certificate	Sept. 16
Opal Ingraham	—	—	—	—	O.K.		Sept. 30
Odell Glenda	—	—	—	—	O.K.	Certificate	Sept. 23
Eunice Stevens	—	—	—	—	O.K.	certificate	Sept. 24
Courtney Bullock	—	—	—	—	O.K.		Sept. 30
Mary Margaret	—	—	—	—	O.K.		Sept. 30
Johnnie Doll Collier	—	—	—	—	O.K.	certificate	Sept. 28
Lindsey Raymond		X	X		O.K.	certificate	Sept. 30
Percy Elizabeth			X[D]				Oct. 4
Clifford Ivy	—	—	—	—	O.K.	Certificate	Sept. 24
Jackson Ellen			X		O.K.	Certificate	Oct. 1

Dental chart of the first grade, Power School, Miss Emma Green, teacher. This room had the highest average in Jackson at the examination, September 30, 1921, showing that eight pupils out of the thirty-five needed work, which was completed four days later.

way than I had dared hope. If we can add effective toothbrush drills, our boys and girls here will have clean teeth all the year.

An improvement which will save time for the dentists is a printed certificate, leaving blanks for the child's name, date, and dentist's signature. We will have the city furnish a number of them to each dentist.

There is another fault in our plan. We have had no way to equalize the charity work done by our eleven men. This year we will have printed slips which the principal will fill out with a child's name and the date. These cases will be sent to the dentists in rotation.

The work described is in the white grammar schools, the pupils are Anglo-Saxons and there is a very small amount of charity practice, perhaps less than 10 per cent. This year we expect to operate this plan in the negro schools thru the negro dentists. Having no desire to burden the people with charity, the dentists do only the examining gratis, each family paying the dentist of their own choice for his work.

We believe it entirely possible for any town in any state to do similar work, which is unique in the fact that no funds were behind it. Any town where there are several dentists and several teachers should make a start in this phase of health work, which can be so accurately followed up, which shows such quick results and which is of such tremendous importance to this and coming generations. The force of the National Dental Association or certainly the state organizations should further work of this character, stimulating and directing the scattered local workers.

May each town in the country, each teacher, pupil and dentist receive the following words as a challenge! This work can be done in any community where these three invincible powers are united: a loyal corps of teachers who have a positive genius for follow-up work, hundreds of enthusiastic and responsive boys and girls, and the co-operation and encouragement of the local dentists. That the Jackson schools have reached this goal in four years is due to the hard work of these teachers and children, and to the unremitting toil, self-sacrifice and vision of the Jackson (Mississippi) Dental Society.

THE RELATIVE MERITS OF OUR PRINCIPAL FILLING MATERIALS AS KNOWN AND USED TODAY

By JAMES MARK PRIME, D.D.S., Omaha, Nebraska

(Read before the Chicago Dental Society, November 15, 1921)

MY STORY shall be concerned in a comparison of our filling materials. My conclusions shall not be confined to results of one office, as I have tabulations of twenty-eight thousand filling operations from other operators. For obvious reasons and brevity only the principal materials will be discussed. The porcelain inlay has proved itself a valuable restoration, but for reason of its very limited use we have purposely left it out. Oxyphosphate and copper cements, gutta-percha and copper amalgam having a very limited use for special purposes, are omitted.

We wrote to fifty operators from widely separated locations in the United States and received 28,729 tabulations. We asked reports on four materials—gold foil, cast gold inlay, amalgam, and silicious cements. These tabulations do not include inlays used in abutments for bridges, pit cavities in buccal surfaces of molars, large compound cavities involving so many surfaces as to amount to a large portion of the crown restoration.

Were we to attempt the history of gold foil and amalgam it would carry us back to the early days of filling teeth. These two materials have stood well the test of time and, according to our data received, are still holding a place in the operative procedures of many good dentists. The cast gold inlay and silicious cements are new advents. We find them claiming important places. The cast gold inlay especially is crowding out the other materials in many of our good offices. Its advent marked a very important epoch in operative dentistry. The dental profession and all humanity owe to Dr. William Taggart the undisputed honor and a never dying gratitude for this benefaction. His great discovery is not confined to operative procedures but has proved a great boon to prosthetic dentistry. The other newcomer, silicious cements, were we to judge by our personal opinion and the data gathered in preparation of this essay, is losing, to some degree, the coveted place its sponsors hoped for it.

After years in application of these materials by conscientious operators, employing them in their regular practice and by intensive study club work, it is well to pause and check up results. Who can do it in all fairness? Who will do it without showing a preference or perhaps a prejudice ere he finish? Can the personal equation be laid aside and the facts alone allowed to speak? Dentists seem to be strongly akin to other folks in that they are given to extremes—are prone to fads and hobbies—carrying a thing (which in moderation is good) to such extreme that it becomes faulty.

Teeth are lost as a result of two primary causes: death of the dental pulp resulting from caries, and diseases of the investing tissues. To prevent these is the most valuable service we can render. Operative dentistry, therefore, becomes secondary only in importance to prophylactic procedures which will, if properly applied, go a long way toward preventing both death of the dental pulp and diseases of the investing tissues.

We will not argue the point of a comparative value of service with those who have to do with tooth regulation, for theirs is a great good work. This essay must be confined to filling operations which we conclude is *one* of the *two* greatest services we render our patients in the preservation of their teeth.

Prosthetic restorations, at their best, are but a poor substitution for the natural healthful organs. To whom shall we give praise, to the crafty artificial leg maker or to the surgeon who, by skilful surgical procedures, saves the member, restoring it to health and usefulness? Filling operations are, if instituted in time, essentially preventive.

Silicious Cements

Tabulations from thirty operators, giving reports of 28,729 filling operations from silicious cements, amalgam, gold inlay and gold foil showed 11.4 per cent to be made of this material. One office had no fillings made of the silicates.

With the advent of this material came much enthusiasm. It was believed by some that the ideal filling had come: almost perfect harmony with tooth color, a non-conductor to thermal impressions, and easy to manipulate. Time has demonstrated the wisdom of Dr. Black, for it was these qualities he listed as secondary in value and it does not possess to any considerable degree but one of the *first* or *most* desirable qualities as given by Dr. Black, namely: "Indestructibility in the fluids of the mouth, adaptability to walls of cavities, freedom from shrinkage or expansion after having been made into fillings, resistance to attrition and sustaining power against the force of mastication." Adaptation to the cavity walls is the only first or most desirable quality it possesses.

Further objections may be offered to this material in that a smooth, rounded contact point is very difficult to make and practically impossible to maintain. The surface usually becomes roughened, and the margins jagged and uneven, inviting the retention of debris, providing a nidus for recurrent caries. This is very evident if the filling is dried and examined with a pair of Beebe's binocular loupes. It may also be evidenced by the passage of silk ligature. One of its greatest fields of usefulness is in the proximal cavities of the incisors and cuspids and if we are to follow well-established rules of cavity preparation its use is greatly handicapped here by reason of the histological arrangement of the enamel rods. As we approach the incisal angle of these teeth the rods become strongly inclined to the incisal. If this enamel wall is laid parallel to the long axis of these rods we have a long attenuated point on our filling running toward the incisal edge. By reason of the friability of this material it is unfit for use in well-prepared cavities of this class. It is used with much success in gingival third cavities in these teeth.

Some operators have criticized it, claiming it caused the death of many pulps. We have made wide inquiry on this point and there exists a great difference of opinion. During its early use there seemed to be justifiable cause for this complaint. This trouble, however, seems to be passing, possibly due to a constitutional change by the manufac-

turers. In justice to this material it must be said that a most beautiful color harmony may be secured, a result surpassed by no other material. This harmony, however, begins to be lost in a short time and within a very few years presents an appearance very objectionable. A very few cases have come under our observation that looked good after years of usefulness.

Results would seem to justify their continued use in special, selected cases, particularly in mouths of young women where gold would be objectionable. In these cases the patients must be fully instructed in the fact that the fillings must be kept under observation and replaced when evidence of failure begins to develop.

Amalgam

The tabulations from the thirty men covering 28,729 filling operations showed 33.5 per cent of these operations to be made with amalgam. These reports come from offices, the clientele of which is much above the average. The greater part was from city practices. Therefore we feel sure an equal number from small-town dentists would show a much higher percentage in amalgam. Since more fillings are made of amalgam than any other material it is of importance to us. Notwithstanding the poor materials so often used, and the careless method in which they are employed, the results are many times but little short of astonishing. Recently a patient called at my office and asked me to examine a lower molar and bicuspid. These teeth were filled with amalgam, the molar a mesio-occlusal, while the bicuspid filling had no occlusal extension. They were in fair condition and the patient said they were made forty years ago. He further said the dentist was a drug addict and was much under the influence of the drug when he did the work. We know this is an unusual case, but would it not be unusual with any other material? What material will remain so long in a cavity where a margin will be so opened that an explorer will find it easily? We have reason to believe they have been in this condition for some time. True, many times we find recurrent caries under these fillings and their removal is always advisable. Yet we often find the walls much discolored and no decay present, the pulp having made a most successful recession and the tooth tissues remaining in good condition. Does not the explanation lie in the fact that the oxides of the metals, of which the alloy is composed, exerts an inhibitory influence on bacterial growth? Amalgam would give us better results if we would give it more time and consideration. We should give more attention to: cavity preparation, high grade alloy, thoro amalgamation, as advocated by William Harper, thoro adaptation to cavity walls, heavy hand or mallet force or both, an unyielding matrix, not leaving overhanging portions on occlusal and at gingival, and all parts thoroly polished.

The Cast Gold Inlay

In the fillings tabulated as before mentioned, 29.1 per cent were of cast gold inlays. In three offices this was the only form of gold filling used. The percentages ran from 0 to 89.6 per cent.

The cast gold inlay has no competition for its brilliancy of advent. A gold filling that could be made outside the mouth and cemented into the tooth was received with world-wide enthusiasm. Dental magazines were filled with descriptive matter and inlay clinics at once became a strong feature at dental conventions. Casting machines in profusion flooded the market. Gold pluggers were thrown aside and castings, good, bad and in-

different, were cemented in all classes of cavities in all sorts of teeth and conditions. The results had the effect to prejudice the more sober-minded men against the inlay.

Its enthusiasts have sobered down and thru careful study and scientific experimentation the inlay has taken a prominent place in a majority of our best offices. The statement that it has displaced amalgam as our second best filling material will meet with but little contradiction. Doubtless many would give it *first* place.

One of the points in which the inlay strongly appeals to the operator lies in the fact that the laborious malleting incident to gold foil is overcome. Another lies in the fact that inaccessible cavities in back teeth are more easily reached. Then, too, the avoidance of discomfort to the patient by malleting gold foil, is argued as a great advantage. There is also ground for the contention that better tooth form is usually secured by the use of the inlay. Some contend the inlay to be a time saver over gold foil. In justice to the inlay we must say that by the use of the hard golds a wonderful resisting surface to the force of attrition and strong enduring margins and resistance to interproximal wear are secured.

It appears that a strong point for the inlay develops in that more shallow cavities may be made, where conditions admit, in a more narrow gingival wall as well as shallow pulpal walls. Some have claimed, with a reasonable amount of truth, that the box form, with its flat seats, line and point angles, need not be developed so highly with the inlay, because, since the filling is placed en masse, it does not require the building form necessary for gold foil. Theoretically the thin layer of cement interposed between the gold and cavity walls would tend to prevent thermal shock and give to the dental pulp a degree of protection not secured by placing the metals directly against the tooth structures. Experience seems to have demonstrated this to be largely theoretical, as we are likely to get pulp-shock from thermal changes and sometimes death of the pulp under any metallic fillings.

No doubt the greatest and ever-present weakness of the inlay lies in the fact that it must be retained and sealed by a weak and soluble cement. It is unfortunate that this material, so treacherous and unreliable, must become a part—a very important part—of our filling. It functions to be both a physical retainer and a marginal sealer. As evidence of its weakness we could offer no better proof than the well-known fact that a filling made entirely of this material is a most temporary affair. Our only hope of success lies in our ability to reduce this faulty cement line to the least possible minimum; in other words, to fill the cavity to the greatest possible degree, especially at the margin, with the metallic portion of our filling. Time has proved false the oft made statement that the cement will disintegrate only to a depth equal to the width of the marginal opening. This would be a most fortunate thing were it true. Time has thus far demonstrated that the greater tendency to disintegration lies at the gingival margin and on the occlusal surfaces. An explanation of this perhaps lies in the fact that the gingival margin is almost constantly bathed in a more or less stale mucus intermixed with inactive saliva creating a condition favorable to acid medium, which may attack the cement. The churning and washing against the cement margins at the occlusal could not but create a strong tendency to erosion in a substance so soluble as cement. There appears to be a marked difference in the behavior of cement

under gold and under porcelain. Inlays made of porcelain and fitting the cavities very poorly, thus exposing a considerable cement margin, endure a surprisingly long time. Does the explanation lie in the fact that porcelain is unchangeable under varying temperatures? We know gold expands and contracts under these conditions exerting a possible detrimental effect upon the non-elastic interposing cement. This is offered because I have no better explanation. It is a well-recognized fact that cement endures in some mouths much better than others. Those mouths in which it stands well are very rare. Cemented inlays are certainly indicated more strongly in these mouths than in those where cement is destroyed so rapidly.

Cement being opaque creates a constant danger to tooth discoloration. If allowed to remain under thin or unsupported enamel a disagreeable discoloration follows, resembling discolored, pulpless teeth, a more objectionable sight than the metallic portion of the restorations. This is perhaps one of the most disfiguring faults we see in the mouth. By some operators we have observed a radical, dangerous overcutting of teeth in cavity preparation for inlay restorations, unnecessarily weakening walls and encroaching upon the pulp, with the further possibility, as above mentioned, of tooth discoloration. It need not be said that such practices, should be discontinued. Human teeth are small. Cavities in them require great care. Examination of the prepared cavity, as well as careful examination of all margins, require assistance to the eye or more magnification than that provided by glasses as ordinarily worn. The thing very splendidly adapted to this purpose is the above mentioned Beebe binocular loupes.

Gold Foil

The successful use of this material requires much preparation in mind and a high degree of manipulative skill. Altho we requested tabulations from operators using gold foil much more than the average (requests made of members of two gold foil study clubs), yet the average for 28,729 filling operations was only 26 per cent. Three offices reported no gold foil fillings. Another made but four. A few others made less than one hundred. Six gave reports close to 50 per cent. In two offices this was the only form of gold filling used.

A poor gold foil operation is a 100 per cent failure from the time it is made. It requires sufficient time for good cavity preparation and a careful management of the foil from the beginning until the operation is completed. It must be admitted that the operation is a laborious one. It never appeals to the slothful, lazy man. The gold foil operator labors constantly between the two dangerous extremes—one to sufficiently condense the gold to keep the specific gravity at fifteen or over; the other to avoid wedging the gold so strongly against the cavity walls as to fracture them. Between these two extremes he must work and correlate his stepping of the plugger with a line of force to secure thoro adaptation to the cavity walls and also a gripping on the filling by these walls. It must be remembered that we are expanding the dentin, which is a highly elastic material, overlaid with a non-elastic enamel. If the dentin is overexpanded the enamel will show checking because the enamel cannot expand. Slight checking of the enamel is not, however, a serious damage, as a rule, but it should be avoided as much as possible. After the foil is placed and the filling built to form, the finishing process is one requiring careful attention. Trimming out the surplus of gold at the gingival must be accomplished in such manner as not to injure the septal tissue. The proximal surface must be trimmed and finished to natural

form leaving a rounded marble contact, never a flattened surface. Should the operation be one restoring part of the occlusal surface, this must be finished to true anatomical form, leaving no rough overlapping margins. The whole operation must be made extremely smooth and perfectly flush with the enamel surfaces, at the same time faithfully restoring the natural forms of the teeth. The habit of filling cavities overfull and then grinding the surplus out with stones and other instruments is a very wrong procedure, entailing much loss of time to say nothing of the discomfort to the patient. The tooth form must be restored with the plugger, with a surplus over the margins only.

If we fail to properly finish the occlusal portion by allowing rough and overcovered margins to remain, we are inviting early recurrence of caries. If the proximal surface is left rough, debris will accumulate and plaques will form, which will attack the enamel of the approximating tooth. Last but not least, if the gingival portion is left improperly trimmed and polished an inflammatory condition of the gingival tissues follows. This is easily observed in labio-gingival and bucco-gingival fillings where the gingival tissues continue inflammed and swollen. Upon close examination a roughness will be discovered. Here is a difficult place to get a perfectly polished and finished margin and to accomplish this it is advisable to cut the gum tissue well away, exposing the margins plainly to view before the operation is made. This finishing does not apply to gold foil alone, but to all other filling materials.

Gold foil offers a material with which the cavity may be entirely filled, no part of which can be affected by the secretions of the mouth. It is the only filling material known which, when placed tightly within the cavity walls, will continue indefinitely in this condition. There is no better material known in its protection to enamel margins. It is the only material with which a reasonable amount of separation may be secured as the filling is built. It holds first place from the standpoint of surgical cleanliness. With the dam in place the cavity is prepared in a most cleanly manner, and freshly heated, sterile gold is wedged securely against these walls, sealing them against the entrance of moisture for an anticipated time, longer than any other known filling material. It is the material least inclined to tooth discoloration. It is the one material capable of being wedged between the elastic walls, and, by these walls, continually gripped and firmly held. The expansion or contraction of the gold under heat and cold has no effect whatsoever; as vital dentin has about 40 per cent more elasticity than malleted pure gold, it maintains, under all conditions, a firm grip upon the filling. It is this principle which preserves the excellent adaptation of the filling to the walls of the cavity. In brief gold foil, as Dr. Black has told us, possesses in much the greatest degree those first essentials to a permanent filling material.

No material is so admirably adapted to filling fissure cavities on the occlusal surfaces of the teeth. These fissures may be followed out with small inverted cones, making very slight extension with the chisel, with the result that an ideal operation is secured with little tooth structure lost. In this connection it might be well to say that the chisel is a dangerous instrument for the extension of the occlusal step in cavities. If large portions of the enamel are broken away at one thrust of the chisel, the inclination of the rods are such as to cause undesirable extension. This, we think, is responsible in many cases for the unnecessary widen-

ing of the occlusal step. The use of the chisel is not condemned for this purpose, but it must be very sharp and used with a planing motion, removing the rods in powder rather than in large pieces. This extension may be safely made with plain fissure burs.

Soft, unannealed gold may be used to great advantage in getting better adaptation in the gingival third of proximal cavities in bicuspids and molars and on pulpal walls, etc., but must never be used in restoring the occlusal surfaces.

CLASSIFICATION OF FILLINGS

	Gold Foil	Gold Inlay	Amalgam	Silicious Cement	Total
Incisors and cuspids:					
Proximal	2,792	691	33	2,338	5,854
Gingival third	805	294	55	591	1,745
Bicuspids:					
Occlusal	444	188	279	25	936
Mesio-occlusal	490	627	366	74	1,557
Disto-occlusal	690	1,242	1,057	19	3,008
Mesio-disto-occlusal	148	873	218	4	1,243
Gingival third	332	179	233	141	888
Molars:					
Occlusal	846	695	2,530	22	4,093
Mesio-occlusal	511	1,558	1,684	10	3,763
Disto-occlusal	164	983	1,466		2,613
Mesio-disto-occlusal	27	824	336	2	1,189
Gingival third	227	213	1,366	37	1,843
Totals	7,476	8,367	9,623	3,263	28,729
Percentages	26.0	29.1	33.5	11.4	100

PERCENTAGE OF FILLINGS USED IN 1000 CASES

Gold Foil	Gold Inlay	Amalgam	Silicious Cement
43.8	0.9	48.1	7.2
29.1	20.0	50.9	0.0
47.2	39.8	11.2	1.8
19.4	0.0	56.0	24.6
0.0	72.6	12.0	15.4
0.0	59.5	24.0	16.5
0.0	43.6	42.6	13.8
7.3	70.2	7.5	15.0
0.4	89.6	0.0	10.0
58.0	0.0	19.0	23.0

CONCLUSIONS

The silicious cements have a very limited field and should be used only in those cases where cosmetics become the governing factor in the choice of the material.

Amalgam, altho relegated, for the time at least, to second place, is a material with proved merits. It has stood the test of time and no doubt is being put in more cavities today than any other material. In proportion to time and energy spent, the results, in teeth where it is indicated, are perhaps better than from any other material. It is a boon to the operator with a heavy practice, where, for economic reasons and lack of time, it would be impossible to use gold in any form.

The cast gold inlay is evidently here to stay. It will continue, at least, to be used until something better is known. Its field of application, like other materials, is limited. It is indicated in those cavities where extensive caries or fractures have destroyed the walls so that gold foil cannot be successfully used. It is also used in those inaccessible cavities where the use of gold foil would entail long tiresome work and where the results would be, in all probability, not so good as those secured with good fitting inlays. It is used, too, when there is a weakened condition of the peridental membrane, where to use gold foil would cause much discomfort to the patient.

After much experience and observation we are convinced that the indirect method, tho perhaps requiring more time, will, especially in large restorations, produce a higher degree of excellence than the direct. The hard golds now in use are a great improvement and we believe when once thoroly tried will continue to be used.

The rubber dam must be used whereever possible in all cavity preparations as well as cementation of inlays.

Altho just a little out of line of my

subject, it may be well to say that in any procedures whereby any part of the masticatory surface is restored, the final adjustment cannot be secured at the first sitting. The patient is asked to close the mouth. The restoration may be adjusted to comfort, but that only registers *one* position of the mandible and that is a conscious one. The movement of the mandible in use is an unconscious act and the patient must be asked to return, so that the restoration may be trimmed and adjusted as evidenced by the markings from unconscious usage. If this is not properly done the teeth must make their own adjustment with a probable injury to the peridental membrane, thus causing a possible disarrangement of contact relationship; the tooth or teeth will give evidence of lameness.

If frequency of use were a true criterion for excellence we would be compelled to grade our materials in the following order: (1) amalgam, (2) cast gold inlay, (3) silicious cements, (4) gold foil. We know that volume is not necessarily an indication of excellence—that quantity and quality may bear an inverse relation. I shall never forget a motto printed in large letters and hung on the wall of the little old schoolhouse on the western plains of Nebraska, where I learned my first sentences. It read: "It is not how much we do but how well."

A high degree of success lies, perhaps, as much in the ability to determine what is indicated, in a certain case, as it does to have the ability to do the thing well after that decision is made.

We believe the inlay deserves a place in our operative work. We believe there is a very limited field for silicious cements, but we do *not* believe they have won or deserve the wholesale use to which they are being put.

The excuse that our patients will not endure malleting is a poor and flimsy one. Hundreds of our best operators, using both the inlay and foil, will bear testimony to this fact. Don't let us lay our faults or inabilities at the door of our patients. We often hear the excuse offered that an inlay can be made in so much less time. To throw a little light on this point, as results of work in our office, my secretary has gone over our records and selected fifty inlays in bicuspids and molars. Also the same number of gold foil fillings in the same class of cavities. Practically all the inlays were made by the indirect method. Laboratory time includes investing the wax pattern, but does not include the burning out. The average time for the fifty inlays was two hours and fifty-one minutes; the average time for the fifty gold foils was one hour and fifty-four minutes.

It is a well-understood fact that cavities prepared for inlays require more time and attention than is necessary for gold foil or the plastics. All slight undercuts must be filled with cement, or some other material, or the cavity wall must be extended by cutting until the undercut is removed. This requires, as you well understand, time and attention. If cement is used to fill the undercuts, a few minutes of waiting is necessary for the crystallization. How often have we thought we had the cavity prepared so the wax, or the compound impression, would draw, and discovered when we undertook to remove our materials that they would not withdraw without breakage or distortion. If slight irregularities exist in the walls of cavities (which do not undermine the enamel) they may be considered advantageous, if the cavity is to be filled with gold foil or either of the plastics. These slight irregularities lend stability and firmness to the operation.

An opinion almost universally exists

thruout the profession that the gold foil filling, where indicated, is the best operation known. The disposition not to make it is very nearly as widespread. Is it from lack of ability? If so, are we to continue our boast of progress? Shall we attribute it to inertia? What answer shall we make when leading men in our profession will say, "I haven't made a gold foil operation since I left college;" "A roll of rubber dam will last me six months;" "My patients will not endure it;" "I know it is better but it is too difficult," etc. Why this condition? Are the colleges training the students to understand the manipulation of gold foil and are they not requiring them to not only become skilled in its use but to do it until its use becomes fascination?

Is an interest, such as it merits, manifested in the organization of gold foil study clubs? Of how many gold foil study clubs do you know?

Has not commercialism—the common enemy to the higher conscience—been a factor?

Are the instructors in inlay classes sufficiently skilled in gold foil work so that, by personal experience, they become competent witnesses to bear testimony of the excellency of the inlay over the gold foil?

Have the substitutes for gold foil had enough of that one supreme test, the test of time, by which all things are measured and before whose bar they must stand or fall?

Every college not fully provided with competent gold foil demonstrators should never be graded among our high-class schools.

Training the student in the management of gold foil not only prepares him to properly use this material, but raises his morale and prepares him for other more highly complicated technical procedures.

I could not close this essay without mentioning some of the great men whose lives and works inspire us to greater effort and anchor us to an abiding faith in the use of gold foil, where indicated, in filling teeth; Dr. G. V. Black, whose life is a memory but whose monumental works still live; Dr. Johnson, Dr. Darby, and Dr. Woodbury, whom we are still privileged to see and love.

Many have added notable and praiseworthy contributions to the other filling materials. We could mention the names of many, who have left us a heritage in wealth of knowledge.

It is better for you and for me, here and now, to solemnly resolve to dedicate our most sincere efforts to carry on the work that their labors shall not have been in vain.

THE SURGICAL MANAGEMENT OF SERIOUS FOCAL INFECTION CASES WHEN CAUTION IS TO BE EXERCISED AND WHEN SURGICAL PROCEDURE IS INDICATED

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THERE are so many diseases that can be traced to oral focal infection, making the field so large, that this paper will aim to deal only with patients sick so as to make dental and oral surgical operations a serious procedure. The heart being the organ most concerned in that class of cases, we will confine our remarks largely to that field, and will discuss them only as they concern the oral surgeon.

The chief object of this paper is to present for discussion one feature of the practice of dentistry and oral surgery that is not receiving the consideration it deserves. There is a splendid paper[1] written by H. E. Friesell telling us in substance that the foundation branches taught in the dental school will eventually be equal to and the same as those taught by medical educators. Then it will be easy to deal with cases demanding judgment that will guide us in the management of cases being treated jointly. But until that time we should endeavor to so prepare ourselves that our judgment will not only be equal to but surpass that of the general surgeon in this field, because he cannot know his patient from the dental point of view.

The class of patients mostly requiring surgical judgment are those suffering from some form of heart disease and while the different gross symptoms detected in the examination of the heart are just now causing a great deal of difference of opinion when it comes to the interpretation of them, there are, however, things that are important for the surgeon to know. Both low and high blood pressure is of importance and we should know, if we can, what it is caused by or at least with what pathology it is associated.

Quoting from a recent article[2] written by Arthur R. Elliott of Chicago, he says:

> The net result of persistent arterial high blood pressure, after due allowance is made for physiologic factors of adjustment, is overwork to the dynamic side of the circulation—the heart and the arteries.
>
> For a variable period compensatory adjustment proves adequate to maintain circulatory equilibrium, but in course of time demands on the heart resulting from stress and strain and continued high blood pressure outrun cardiac adaptability, and exhaustion of heart muscle takes place and circulation ceases. As observed clinically, this type of failure may manifest itself in several ways. The heart perhaps, without previous display of serious indications of exhaustion, may suddenly collapse under the strain and death takes place with the phenomena of acute dilatation. This is, comparatively speaking, an unusual form of circulatory failure in a high pressure stasis, and is most often induced by severe, sudden physical or emotional overstrain.

Taking those conclusions into consideration at this point I would like to call your attention to a certain type of case with which we are called upon to deal. A patient, for instance, was brought into the hospital complaining of pain and stiffness in the back; pyorrhea; tonsils

[1] *Jour. Amer. Med. Assoc.*, November, 1920.

[2] *Jour. Amer. Med. Assoc.*, May 28, 1921.

infected; knee-jerk exaggerated; varicose veins in both legs; murmur in aortic area undefined; urine examination, specific gravity 120; reaction, acid; albumin hyaline casts, bacteria, a few. The family history showed father, mother and three sisters living and well. One sister died of pulmonary tuberculosis at the age of sixteen; wife and two children living and well. Previous diseases: grip, tonsilitis and rheumatism and an operation for appendicitis in 1903.

The chief complaint at this time was pain in the back and the lower lumbar region. The patient was a tall, bony thin man. His clinical history is as follows: Began complaining of pain in right leg, due to varicose veins; pain radiating to right pelvis. An acute phlebitis supervened. Several weeks later he developed phlebitis in left leg. Pain and cramping in lower lumbar region were persistent at this time also. For three weeks the patient complained mostly of severe pain in back, which was aggravated upon receiving a jolt of any kind. He was weak in the lower limbs. In turning in bed he received severe catching pain in back, lasting but a moment and returning with the least movement. He gave a history of renal colic recently and thirteen years previously. He had frequency of urination and pain resembling renal colic or bladder tenesmus.

I was asked to see this patient and advised by the physician to remove all of the infected teeth, which meant all of them. At that time his pulse was not particularly rapid, nor very strong, but was regular and seemed to be of a fair quality. There was, however, something alarming in his general appearance; he apeared to be apprehensive and easily shocked. It was thought best to see him two or three times before doing any extracting in order to allay his alarm, and detect if possible any changes that might occur from day to day. But upon finding him in the same condition each time, and upon the physician's advice, two teeth were extracted, with no bad results except a pulse of eighty, if that could be considered an exaggeration. Three days elapsed, during which time he was kept under observation each day and as he appeared to be as well or a little better than when the last teeth were extracted, six more teeth were removed. His condition remained about the same on the ninth day, when five more teeth were extracted. At this time he appeared to be feeling much better, and on the tenth day the patient's condition was very good. On the eleventh day, four additional teeth were extracted. These teeth were all loose. The patient was feeling particularly well and slept soundly until three-thirty, when he complained of shortness of breath and died at four forty-five of acute dilatation of the heart or muscle exhaustion and collapse.

The postmortem findings showed adhesions from the left lung to the pleura above the diaphragm; adhesion of large blood vessels to the sternum; left lung adherent at lower pole; lower left lung congested and hard, showing a mottled and consolidated area; right lung dark red, but soft, a postmortem change; no nodules or scars, heart large; pericardial fluid normal in color and amount; whitish spots present on posterior surface of heart near the large vessel; slight dilatation of the right auricle, with a thin wall, which may indicate previous dilatations. It may be that the auricle failed with a sustained pressure. All of the valves and coronary vessels were normal except in the right auricle. Liver about one and one-half of normal size, dark red in color, with sharp edges; gall bladder normal; stomach showed an old healed ulcer near the pylorus; many adhesions about the appendicial scar in right abdominal region; enlarged glands near the tail of pancreas. It would seem that in the beginning it was a focal infection patient that passed thru all of the changes suggested by Rosenow. Spleen and left kidney slightly en-

larged; otherwise normal in appearance; right kidney normal in appearance; prostate fairly large and adherent to pelvis; intestines normal. Laboratory findings showed a mild condition of brown atrophy. Cultures were made from mottled area at once, but they were negative after three days' incubation. Liver showed central passive congestion. Cause of death, acute dilatation of heart. Coronary vessels appeared to have been obliterated in the walls of the auricle to some extent.

My object in introducing this record at this time is, first, that we take into consideration the question of shock. We are liable to deal with shock as it is associated with people who are not particularly sick. The fact is that there are many patients with dangerous pathology and when we add to that the shock associated with anything in the nature of an operation, we are jeopardizing the patient's chances. The temperature in this case was normal except for a short period, when it went to 99.8°, and it would probably have made but very little difference with the patient except as far as time was concerned. Undoubtedly this patient had lived very close to the length of time his pathology would permit him to live. However, we must not assume that in cases of this type the operation has not contributed to an earlier termination of life. The patient had a history of circulatory degeneration. He undoubtedly had, due to focal infection, a gastric ulcer that healed, and suffered from phlebitis which never seemed to entirely cure itself. Taking the whole history into consideration he could not be considered a good risk for even extraction of teeth, and while we can, as a rule, rely on the judgment of the physician in charge, yet many times it is impossible for him to advise as to the safety of a slight operation and it will be necessary for us to prepare ourselves in such a manner as to assist in detecting the dangers that are liable to follow in the wake of minor operations upon the jaws when the pathology of the heart and circulation apparatus is seriously impaired.

Let me present a different but dangerous type of patient suffering from sore jaw, roughly speaking, due to an infected impacted third molar, abscess and pyorrhea having followed the extraction of one of two teeth. Within a few hours the pulse and temperature rose abnormally high, remaining in regular physiopathological proportion, but did not yield to medical treatment. until the sockets from which the teeth were extracted were reopened and drained. A few days intervened before another extraction of pyorrhea infected teeth, which was followed again by the same sequence of a rapid pulse and temperature and relieved again by the reopening and draining of the socket from which the teeth were extracted. And in that particular case, following the extraction of each infected tooth, it was necessary to maintain free drainage in order to prevent an exaggeration or racing pulse. That is one type of case that demands attention following the removal of teeth and points out the value of watching every infected case and providing proper drainage for it. The object in removing a focal infected tooth is to establish drainage and the same principle applies here as in the drainage of an abscess in any part of the body. It is that kind of a case, if neglected following the operation for removal of teeth, that is liable to prove fatal, but if attention is given a fatality can be avoided, because the patient's pathology is not of the type that was beyond repair. However, in the first case cited the damage had gone beyond correction.

Here are two types of cases, both dangerous. The one dangerous immediately because of injury done to the different organs by the original infection and overstrain on weak heart muscles; very likely a case that would continue for eight or ten days or longer, and if

attention had not relieved the patient. he would die of a general infection.

There is a type of case that you can always consider dangerous. It has been our experience in St. Agnes Hospital in serious focal infection work that whenever it became apparent that the patient was or had been one of high pressure and that had produced high pressure stasis changes in the kidney, the symptoms of which were a lack or failing functions, it was toward a fatal termination and was beyond the help of physician, general or oral surgeon.

Let me at this time discuss a case that originally was one of high blood pressure with cardiorenal complex. It is not the case of high blood pressure at the time we operate that is always dangerous. It is more apt to be the case that has once had high blood pressure and is now losing that feature, indicating that the heart is yielding to a gradual exhaustion of myocardial tonus, with the characteristic syndrome of progressive asystole and falling blood pressure with kidneys failing in function. It is that type of patient to which our attention is called, especially where the pulse remains fast and feeble and at the least disturbance in the nature of an operation there is an increased number of beats of the heart, continuing over quite a long period of time after the extraction of one or two teeth. We are dealing with a heart whose muscular structure is weakened to a point where it is dangerous to the life of the patient to do anything in the nature of an oral operation.

Just let me give a short record of this case. At the time this patient, a man forty-eight years of age, who had been an electrician in the active part of his life, was brought into the hospital, the diagnosis showed cardiorenal complex nephritis primarily. He was married, wife and two children living; previous diseases and injuries none; addicted to coffee, tea and tobacco. His chief complaints were shortness of breath, dizziness, loss of strength and weight. Dental history showed that he had a severe pyorrhea, which resulted in the loss of five or six teeth in a few years; at this time he had eight or ten teeth loose and infected. Urine was examined, which showed indication of an advanced nephritis present. He had a severe sense of pressure in mid-abdomen, was pale and anemic and had lost thirty-five pounds during the year. No teeth were extracted at this time because it was not considered safe. The patient was discharged, but returned in six weeks for treatment, very weak and restless, suffering from dyspnea. Six teeth and roots, all of which were very loose, were removed to get rid of infection, according to the physician's instructions to the oral surgeon. Oral surgery notations indicated that the patient was a poor risk. On March 7 two more teeth extracted; on March 9 he was discharged, apparently improved. I might say, however, that following the extraction of each of these teeth this patient showed a tendency to run a fast feeble pulse, which did not improve as time went on; it was decided therefore that the risk was too great. The patient returned again and appeared to be much improved. An effort was made to remove a few teeth, with a more disastrous demonstration than previously. It was thought best again to discontinue any further extractions at this time. Following the removal of the last teeth the patient became hysterical and was hysterical all night. In forty-eight hours, without consulting a physician, he left the hospital and went home, a distance of forty miles. For a time he appeared to make considerable improvement, and he was anxious to have the necessary teeth removed. After taking the history of this case into consideration and knowing the patient had associated with his circulatory disturbance a nephritis with a failing function of the kidneys it was not thought advisable to do so. In two weeks he died of cardiac failure. It seems to be a coincidence that just previous to collapse,

many times patients with failing circulation seem to be feeling very much better. We should not be deceived by that symptom. This case very nicely illustrates the point stated before, that high blood pressure stasis and failing renal function point toward a fatal termination.

One of the most important things to guide us in the advisability of operations for people whose hearts may not prove equal to the strain is the pulse pressure. It is not so important to be sure of the amount of blood pressure a patient may have, but it is important to know what the pulse pressure is. Whenever the pulse goes below one-third of the systolic pressure, it is a condition for apprehension. If it goes below fifteen or twenty we must consider him a patient upon whom it is dangerous to operate, and one upon whom it is dangerous also to use any form of anesthetic, local or otherwise. In other words when the systolic and diastolic approach each other it is a sign of danger. It may be that we can rely on the adrenalin contained in the novocaine or apothesine used as an anesthetic; and while it is true that the adrenal raises the pulse pressure, it is only temporary and the reaction is liable to carry the patient to a lower level of pulse pressure and increase the danger associated with the case. We must never forget that not only is the patient in danger from overstrain and shock, but back of all that is the bacteria which was the original cause of the disease, lying probably dormant, but capable still of a tremendous demonstration following the disturbance of its point of location. We must never fail to take into consideration, in forming judgment upon these cases, the amount of resistance to disease, or, in other words, the immunity, which can be arrived at by an examination of the patient's previous history and record and by a comparison with the symptoms manifested at the time of disturbance. If, following the removal of the teeth or an operation on a focal infection area, the patient's pulse rate is increased rapidly and the temperature correspondingly for a short period of time, followed by relapses so that the patient appears to have returned to normal we have a patient who has the ability to develop a resistance or immunity to his disease. In other words, he has the ability to call out antibodies to the point where he is able to combat his disease. We will be guided, then, only as to the extent of work we had best undertake, whether it should be less or more than we have just done. But on the other hand, if our patient develops a rapid pulse and temperature too, which does not subside, then we know that we have a patient whose immunity is not dealing effectively with the elements that make for disease. And there is still another type clinically observed which has probably escaped observation more than any other because he develops a rapid heart action with only a slight temperature and in some cases no temperature at all, but the pulse rate remains materially fast and feeble. This is a very dangerous type of case and without the most careful watching is liable to slip away from both the physician and the dentist.

We occasionally find ourselves confronted with the proposition of the extraction of teeth for a patient who has a very much enlarged or hypertrophied heart. In some respects the hypertrophy is a compensatory measure and while this patient is to be treated with the greatest caution, yet he cannot be considered as dangerous as some other types. He usually will endure things that patients with cardiorenal pathology will not.

We are being very much criticized and physicians too for our unscientific and uncertain use of the word "myocarditis," and probably justly so. W. D. Ross, in his textbook says in substance: Chronic myocarditis is a slow sclerosis of myocardia, developing sec-

ondary changes in the coronary arteries. The essential lesion of the coronary circulation productive of myocarditis is a narrowing or obliteration of the lumen. The result of destruction of the embolic occlusion endarteritis or the coronary circulation is merely part and parcel of general arterial sclerosis. If we are therefore confronted with the proposition of determining just what a chronic myocarditis is, we should think first of the condition as an arterial sclerosis of the myocardia and that its result is not liable to be confined entirely to the heart itself, but symptoms of sclerosis are apt to be found in that type of patient in other parts of the body. Physical signs of chronic myocarditis are not characteristic and distinct. They vary as the disease progresses, as in the acute form of diseases the heart sounds are usually less muscular and more valvular in quality. They are accentuated in the presence of compensatory hypertrophy, and they are enfeebled after dilatation has taken place. The aortic second sounds are frequently accentuated due to arterial sclerosis. The pulse is hard and tense with stiff arterial walls and is often disordered in rhythm. The area of cardiac dulness is often found extended from cardiac hypertrophy or dilatation. Murmurs are encountered in the purely valvular cases and in cases associated with cardiac dilatation. Diagnosis of chronic myocarditis is based partially upon physical signs, but mainly upon the finding of arterial sclerosis in a subject past middle life, who presents such physical signs. Chronic dyspneal signs of pulmonary congestion aid in suggesting the disease. So that while it may be true that the term is being rather loosely used, yet those who are ridiculing its careless use are not able themselves to lay down in absolute terms the diagnostic signs of myocarditis.

There are three local conditions that, while not dangerous to the patient's life are yet serious enough to people's health to deserve mention at this time. One of these is the statement so often made by exodontists that in the removal of teeth if the antrum floor is open no great harm comes of it. In this day of preventive medicine that statement cannot go unchallenged, for the man who makes it does so without taking into consideration the nature of the bacteria liable to enter it and cause disease of the maxillary sinuses. I do not believe it is a wise procedure to allow Pfeiffer's or Friedlaender's bacilli or the streptococcus hemolytica to enter an innocent and uninfected antrum for the reason that the antrum mucous membrane lining is continuous with all of the other accessory sinuses. The activity of those organisms is of such a character that once they gain access to the sinuses it is a very difficult matter to eradicate them and prevent their deleterious effects. As it is impossible for anybody who opens the antrum in an operation for the removal of teeth to know what type of infection is liable to enter it from the mouth, it becomes not only serious but a dangerous accident.

The next type of local work that comes within the border of serious operation is a heroic effort for the removal of the cyst wall and the bone surrounding it in the mandible. It is a better plan to cauterize the cyst wall and stimulate production of granulation loops with iodoform gauze when the cyst has enlarged to a point where there is not a quantity of bone left to insure sufficient strength to endure the slightest strain above that exercised in cautious mastication used by the patient so afflicted. That is true likewise of impacted third molars that are infected and lie so deeply in the mandible that in their removal the slightest pressure exerted is liable to result in a fracture of it. It is saner practice in those cases past fifty-five years of age to remove the obstruction in front of it, facilitating its removal and providing drainage, than to make the patient take the risk of a frac-

ture under those conditions. It is not often that we come in contact with these cases, but I am speaking only of the occasional case which presents itself for treatment.

Since the anesthetic used in this class of work is of importance I will present the following experiments made by myself upon young guinea-pigs, ranging in weight from 250 to 300 grams, to determine the comparative toxicity of apothesine and novocaine so commonly used.

AUGUST 6, 1921

1. Injected pig in heart chamber with 1 c.c. sterile water. Pig lived, showing no deleterious symptoms.
2. Injected pig in heart with 0.08 grains of novocaine. Pig lived showing no symptoms.
3. Injected pig with 0.32 grains novocaine in heart. Pig died within ten minutes following spasm.
4 Injected pig intraperitoneally with 1.6 grains novocaine. Pig lived showing no symptoms of ill effect from the drug
5. Injected pig intraperitoneally with 6.4 grains novocaine. Pig showed marked tetanic spasms, and died within four minutes.
6. Injected pig with 3/16 grains apothesine in heart. Pig died within five minutes, showing general weakness, but no tetanic spasm.
7. Injected pig with 3¾ grains apothesine intraperitoneally. Pig died after ten minutes showing general weakness.
8. Injected pig with 7½ grains apothesine intraperitoneally. Pig died within five minutes, showing increasing general weakness.

AUGUST 12, 1921

NOVOCAINE USED

1 Injected pig with 0.08 grains in heart. Tetanic spasms started immediately after injection. Spasms ceased after a time. Pig recovered entirely.
2. Injected pig with 0.32 grains in heart. Pig died almost instantly after injection.
3. Injected pig intraperitoneally with 1.6 grains. Pig lived, showing no deleterious symptoms.
4. Injected pig intraperitoneally with 1.6 grains, immediately after pig had received a six-second exposure to the X-ray. Pig lived showing no deleterious symptoms.
5. Injected pig intraperitoneally with 3.2 grains. Pig acted normal for about five minutes. He then showed loss of equilibrium and breathed with great difficulty. Completely recovered within an hour.

APOTHESINE USED

1. Injected pig with 0.08 grains in heart. Pig died within a few minutes, showing a general weakness.
2. Omitted, because above was sufficient to kill pig.
3. Injected pig intraperitoneally with 1.6 grains. Pig showed slight symptoms of general weakness, which increased until one-half hour later when pig died.
4. Injected pig intraperitoneally after a six-second exposure to X-ray with 1.6 grains. Pig lived showing no deleterious symptoms.
5. Injected pig intraperitoneally with 3.2 grains. Pig died soon after injection struggling a great deal before expiring.

You can calculate, tho not exactly, the tolerance a certain patient may have by estimating the dose you would give if the blood pressure were normal. If that pressure were 50 but is now only 25, you would reduce the dose one-half. If it were only 25 you would reduce it three-quarters. Take, for example, a patient with a broken compensation. Just at the break, your patient's circulation lost 50 per cent of its efficiency; just how much afterward is hard to determine. This calculation, of course, cannot be considered accurate, but it might be used as a basis of reasoning in the administration of anesthetic drugs.

CONCLUSION

1. We should awaken to the fact that we are sometimes dealing with life and death and that we must share the responsibility with the physician and general surgeon in cases of common effort, and think in terms of medicine and surgery and be able to diagnose.

2. That serious cases should be treated in the hospital where a good intelligent record can be made to aid us in forming judgments that will protect and benefit the patient and where emergency remedies are at hand.

3. That one of the chief dangers is in dealing with a circulation whose heart muscles are weakening and pressure lowering.

4. That when we find, for instance, a heart and circulation going wrong and

associated with renal failure, or nephritis, we are dealing with a case that is probably the most dangerous, not so far as immediate danger is concerned but insofar as fatality is concerned as an end result.

5. That the hypertrophied heart is not always the dangerous case.

6. That the object in the removal of focal infected teeth is to establish drainage and that we should see to it that drainage is maintained in serious cases.

7. That the pulse pressure properly measured is a guide to the safety of operating on cases and that when the systolic and diasystolic pressure approximate each other it is a counter-indication for local anesthetics and shock.

8. That opening the antrum is not good practice and may lead to a serious infection.

9. That to facilitate the removal of a badly infected and deep-seated impacted third molar by the removal of the obstructing second molar in front and above it, in patients past fifty-five years of age, is better surgical treatment than to put them in danger of fracture at that age.

10. That novocaine is safer than apothesine.

Time will not permit its discussion but by a greater effort on our part we can assist in an earlier detection of a beginning myocarditis and extend the lives of many people particularly where it is caused by oral focal infections.

Discussion

T. W. Brophy, Chicago, Illinois: The essayist has taken a great deal of pains to put on paper his findings in the management of these different cases. I feel that the subject as far as I was able to understand it deals with a question of focal infection of rather unusual character. The substance of it all is that we should be cautious and be sure of our ground in the presence of disease and before operating. The object of the paper is to point out that some of the graver diseases contra-indicate procedures that are so frequently resorted to in the removal of teeth and in the performance of other operations in the mouth or elsewhere.

If I may be permitted to say a few words on the subject of oral infections of dental origin I would say that, since the essayist has mentioned the removal of teeth for drainage, I believe we ofttimes may secure good drainage in cases of disease about the teeth without removing them. I believe that any dentist who has the highest ideals of his duty will reason out that he is capable of treating diseases of the teeth and curing them even tho they may be affected by abscesses. What are often called abscesses and infections of the teeth are not abscesses nor infections at all. We cannot see the infections. We cannot see the fluid. We cannot see the pus within the bony surroundings of the teeth. We may see darkened areas which suggest that pus may have been there and that pus may have been absorbed or the pus may have escaped and yet a darkened area may remain. We can secure a darkened area about the end of a tooth root which is absolutely sterile and where infection has never occurred. After the pulp has been anesthetized and removed, you can by making force carry sterile water thru the end of the tooth root and produce absorption of the surrounding bony area about the apex and then in ten days or two weeks the X-ray will show a dark area and ofttimes the dentist says: "Here is an infection." He does not know. We do not know when we see these pictures whether there is infection there or not. We should not think of sacrificing these important structures unless we are sure there is infection there. Even then the disease if any exists may involve the bone only and only the diseased bone responds to treatment.

One thing the essayist did impress on us, was the importance of a careful physical examination in every case where there is doubt as to the patient's physical condition. Consequently the physician and dentist should work hand in hand and the dentist should see to it that there is no abnormality that contra-indicates the use of a local or general anesthetic and they should proceed in a manner that will be to the very highest interest of the patient. I have known dentists who would quite likely for the purpose of drainage remove, for example, the second superior bicuspid and then undertake to correct the alveolus. They often find themselves in the antrum into which they force any infection that may have been within the alveolus. Empyema of the antrum with sometimes very serious consequences follows; in that event the dentist is really instrumental in causing the infection which is far more troublesome to eliminate than infections in any of the tooth roots. In those cases the X-ray will show that the tooth root is in close contact with the floor of the antrum or that the tooth root penetrates its floor. The condition of exuberant granulations which may have been

present at the end of the root may be eliminated by the use of medication and save the possibility of penetrating the antrum cavity and establishing disease which will be worse than the one which the dentist was trying to cure.

When these infections occur our first duty is to determine if possible the location of the infection. We can almost always penetrate the external alveolar plate and draw off a little fluid and we can determine by putting it under the microscope whether we have pathogenic micro-organisms. If we do not find pathogenic micro-organisms, we must let it alone. It will cure itself. Many a tooth has been extracted that was not diseased but the osteitis at its apex or apices would have gotten well if left alone. I hope all will be careful in determining the nature of oral diseases, to differentiate between diseased teeth and diseased bone and needlessly sacrifice neither. Bone once lost may regenerate, teeth never.

Theodor Blum, New York City: I do not quite understand what the essayist wishes to point out in these experiments on novocaine and apothesine. As far as toxicity is concerned, the Council on Pharmacy of the American Medical Association many years ago proved that apothesine is practically as toxic or more toxic than cocaine. The claim made by the manufacturers that the action on the mucous membrane is as strong as that of cocaine is not true. The same is true of novocaine, the effect of which on the mucous membrane is much weaker than that of cocaine.

A. T. Rasmussen, La Crosse, Wisconsin: I failed to hear any reference made to those cases in which you fail to get any temperature reaction when operating in the presence of infection. In my estimation a good active temperature reaction after any operation, upon a septic case, is one of the best indications you can have of that patient's chances of recovery.

In those cases where you have a lot of things to do, reference having been made to the extraction of teeth, do not try to do too much. In those operations in which you remove one or two teeth or a section of the jaw and you get no rise of temperature my experience has been to go slow. Wait at least several days before attempting anything more. However, if you get a sharp rise in temperature, it indicates to my mind that that patient has a vital resistance which will combat the absorption of infection which must necessarily take place. I have in mind two cases, the only ones in which I have removed the entire mandible. In one case we did not get any rise in temperature after operating.

This patient suffered an acute infection in the angle of the mandible about four or five months before I saw him, according to his physician. The infection ran a very acute course and the patient became unconscious in a few days and remained in a state of coma for several weeks. A septic endocarditis developed and the patient was not expected to live. However, he regained consciousnss much to the surprise of his physician. I was later called in to care for the lesion of the jaw. I found the entire mandible necrosed, broken up into several sequestra, some of which were projecting thru the soft tissues. Much pus was flowing from numerous sinuses thru the soft tissue. For several reasons this operation could not be divided up and the entire mandible was removed. There was no rise in temperature after the operation. The wound was kept irrigated and as free from pus as possible. However, in about a week the patient died from general peritonitis.

Another case comes to mind, that of a man twenty-two years old. Examination showed a general infection of both jaws as a result of periapical infections about all of the teeth, except one impacted third molar. This patient was suffering from a myocarditis and was in a very weakened condition generally. He was melancholy and in every way a poor risk for operation. There being no alternative, however, we decided to operate at intervals, altho the patient was anxious to have it all done at once. A complete alveolectomy of the left side o. the lower jaw was done, removing a section of the ramus and the bone of the entire side practically to the inferior dental canal. A very slight rise in temperature followed this operation. Eight days later a similar operation was performed on the right side of the lower jaw. This time the temperature rose slightly higher after operating, but as before gradually returned to normal. One month later under general anesthesia a complete alveolectomy of the entire upper jaw, including radical curettement of the left maxillary sinus, entirely obliterating that sinus, was done. This time there was a sharp rise in temperature, but as before it gradually returned to normal.

We believe this patient's resistance was brought up by doing these operations in that manner. I firmly believe that had the entire surgical procedure been carried out at once the patient would not have survived the shock or the absorption which must follow as a result of the operation. The patient is back at work and supporting his family, which he had not done for several years. I firmly believe that in these kind of cases it is good practice to follow the course as outlined,

building up the patient's resistance so that when the severest shock comes the patient is better able to withstand it.

Arthur E. Smith, Chicago, Illinois: In summing up Dr. Hardgrove's paper we simply arrive at two conclusions: That we should clear up the diagnosis and that there should be a closer co-operation between the medical and dental professions. What will the dentist do in cases presented to him for treatment if he cannot make a complete physical examination of the vital organs? Many things enter into this matter of diagnosis, especially in the administration of nitrous oxide or other anesthesia. One of the great factors is the condition of the arterial and circulatory systems, whether the patient has a mitral insufficiency or a high blood pressure, or some condition that would contra-indicate the use of nitrous oxide or suprarenin.

Removal of these focal infection areas should be thoro and according to the principles of surgery. Our work should be constructive and not destructive. Removal of the foci of infection is, of course, necessary in many cases but what is not indicated is destructive surgery. The increase in blood pressure and whether this is the only pathologic condition present must be considered.

H. A. Tuckey, San Francisco, California: Dr. Hardgrove is dealing with hospitalized patients, patients who are sick whose resistance is low, and the stirring up of these infections without complete removal is a very serious matter.

Is there any one who denies the existence of streptococcus viridans or hemolyticus, or green producing streptococcus at the root ends of pulpless teeth? Is there anyone who can tell us just when these processes are going to break down and become sources of infection?

We are not going to remove pulpless teeth ad lib from patients between the ages of twenty-five and thirty-five as readily as from those between forty and fifty.

Medicine has been built upon the treatment of symptomatic disease and irreparable damage has been done thru delay. Therefore, when will we exert ourselves to operate early enough to prevent such fatal sequelae and awaken to the practical conception of prevention? The doctor speaks of cases that come to the operating table too late. That is the point that I am emphasizing. Pulpless teeth are pulpless teeth, and there is no man who can say that he can control these teeth. They are potential factors of infection and progressively become worse with their retention in the alveoli.

I agree that this work must have for its principle the thoro removal of all infected tissue and definite drainage established. This requires open surgical methods and optical inspection of the field. It must be kept in mind that we are speaking of hospitalized cases. We do dental surgery in every case where it is found necessary to do so, and our diagnoses are made from full mouth X-rays, clinical examination, and, whenever obtainable, the physician's record of the case. The antrum may be opened from the mouth when suspicion warrants. All infected bone should be removed from the antral membrane and if it is necessary to go in, do so, but immediately get out and suture the wound. I do not believe it is posible to immediately chronically, infect a healthy antrum.

To answer the question of the removal of the alveolar plate this is very seldom done in toto, and the only guide is to remove only the amount of the alveolar plate before the teeth are extracted, which would be ordinarly physiologically absorbed after any extraction.

Dr. Hardgrove (closing): One of the discussers indicated that he did not believe a healthy antrum could be infected. I think he wished to convey the thought that there was sufficient resistance in a healthy antrum to prevent its becoming infected. If that were true we would not have so much antrum infection. It is not hard to infect the antrum once it is opened. We have to approach it very carefully to avoid infection. Nature has some wonderful resistance but she has not sufficient resistance to prevent infection of the antrum.

Regarding cysts, I realize that the majority of them are considered physiological anomalies. The thing that I objected to was the removal of the cyst membrane when it becomes infected and granulations have started. I complained of this because it is needless surgery.

The dangerous type of case was the one that did not develop a temperature but did develop a fast pulse. When there is no temperature and there is a feeble fast pulse the patient is apt to have a myocardial degeneration with a week heart muscle.

The X-ray is only an aid in the diagnosis in focal infection work. The important point after all is to reason from a pathologic point of knowledge. The statement was made that in the majority of those cases following extraction the question of whether or not they should have after-treatment in the way of drainage or curettement depended entirely on the type of infection that was there. I believe this statement holds true.

DENTURE ECONOMICS

By R. R. GILLIS, D.D.S., Hammond, Indiana

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

ALL of us find various problems confronting us in every denture case we handle. There are problems of "selling the case," problems of technic in construction, problems in teaching the patient how to use the dentures after they are completed, and some say problems in collecting fees after delivery.

As to problems of "selling the case," I shall first offer sort of an apology for using the term for it has been condemned as being unprofessional. But I know no other that expresses the meaning any better. Altogether too many of our profession are not fully successful because they have a narrow-minded conception that professional ethics precludes their employment of good sound business tactics or terms. Personally I am ready to adopt anything from the world of commerce or the marts of trade that will help me to render greater professional service.

The most interesting patients in our office are the ones who frequently ask questions during the progress of their work—and these questions help us to know how the patient may be best approached. The asking of questions should be encouraged.

Every answer or statement made is for the edification of the patient, with the exception of course of the little pleasantries and conventionalities that attend every visit.

Applying the words of one great teacher[1] to our present problems of informing the patient, he says: "Education is a process of changing them from where they are to where you think they ought to be." If your present patient happens to be a person who has been under your care dentally for several years you have already accomplished a large part of that education. With your old patients there is a relation already established that is not unlike the relation of the old family doctor to his patients. Next to family ties, it is the most sacred and should be held inviolate.

If your patient has been referred the first big link, confidence, is well established and it is for you now to forge other strong links by your every word and act.

It is very essential to have a reasonable answer ready for any question the patient may ask, but do not try to "put one over" if you are in doubt about the proper reply. To be caught in an indefensible position is a serious menace to a continuance of right relations. I would prefer to say "I don't know" than to misrepresent any point.

A patient coming to us for denture service is the most helpless of all patients. He deserves the very best care, planning, and execution that we can command. Many, failing to understand that they

[1]S. A. Courtis, "Principles of Education as Brought Out by the Teaching Demonstration," *Jour. Nat. Dental Assoc.*, January, 1921.

are purchasing something more than mere merchandise, are at first a little impulsive and eager for the completion. Such patients require extra information so they may know that a little time must first be spent in examination to better plan the case.

In our own practice, nearly all denture patients come before their natural teeth are lost.

For the method that affords denture service immediately after extraction,[2] several preliminary steps are necessary in making study models, measurements, and various records. It is surprising how interested every patient becomes and a spirit of co-operation is manifested before we have started the actual operation.

In educational work, one very important aim is to teach the pupil self-direction. Therefore in our present problem let us begin by teaching the patient self-direction. In the past too much responsibility was assumed in every denture case by the dentist himself, the patient failing to understand that most of the chance for success lay right in his own mental attitude. You probably have been impressed by the horrible misfits of dentures that some people wear with full satisfaction. Such patients have learned self-direction in denture wearing; it is really second nature to them.

Next we must teach our patient self-appraisal; that is he must be brought to a full realization of any unfavorable circumstance or condition presenting in his case. I studiously avoid painting a bright picture and yet I aim to maintain the patient's hopes. I want him to expect trouble at first—more trouble than he will actually realize—then he will be more enthusiastic.

We must now develop self-control. We should instruct the patient that every act of mastication has become a problem in leverages and surface adaptation. Let the patient bite with his denture on his finger or a pencil so that he may discover for himself (with our guidance) how forces may be applied favorably and unfavorably. We should demonstrate to him the worst that can happen in dislodgment and then every little success thereafter is an encouraging improvement.

From the very first visit, the patient should be impressed with the fact that his success is our greatest interest and that only by co-operation can the ultimate be attained.

There are some patients who are inclined to demand everything from the dentist and supply little themselves, and we try to eliminate them in the beginning. Then there are others who really assume too much responsibility unto themselves and deny us an opportunity for co-operation. Among these are the ones who hesitate to bother us when a sore spot develops on their gums. They believe they can endure the discomfort and "wear it out." But they should be told never to allow such a sore place to go unattended; they should return for an adjustment and trimming of the denture. Thus we make a practical demonstration of our continued interest, our willingness to co-operate.

When we discuss the case at the chair, so much new information is coming to them suddenly that they cannot comprehend and retain it all. It is well to repeat many points at every visit so that salient features may become better fixed in the patient's mind. Even with verbal repetition, some will not grasp the meaning until they have visualized the words.

For this purpose we use this message for denture patients:

TO OUR DENTURE PATIENTS

Your teeth have been lost because they had become so diseased that they were a constant menace to your general health, a source of discomfort. You are better off with no teeth at all than with the ones you last had.

In providing you with artificial dentures, we cannot promise to restore the efficiency of your own full natural denture. We can make a big improvement over the condition wherein

[2]R. R. Gillis, *Dental Summary*, August, 1920.

you have no teeth at all; if we can improve your condition 5 per cent, it is worth while; and if we can succeed up to 20 per cent, it will be more worth while.

Do not expect 100 per cent. While some patients even go so far as to say that they would not trade their artificial dentures for their own natural teeth as they were, such a high realization cannot be hoped for in all cases.

Upon receiving new dentures, the patient is taking the first step in the process of learning some new things about his mouth and about the process of eating. A few people never do learn these things, either thru lack of patience and persistence or thru lack of willingness to co-operate with the dentist in overcoming minor difficulties as they appear. The dentist cannot and does not undertake to supply this patience and persistence; that is up to the patient himself.

Success in wearing dentures depends more upon the patient than upon any other factor. Patients who begin the wearing of dentures either unwillingly or half-heartedly seldom make a success of it. Those who approach the matter with determination learn with surprising ease and often have quite complete mastery in a few days. Others take weeks or months—and some never learn.

We cannot foretell your success. After we have made dentures to fit your mouth, only your constant application will make them efficient in use.

Upon first receiving your dentures, your chief thought is that you have a mighty big mouthful of something foreign. This sensation is experienced by all patients for a short time, but by constant wearing this sensation soon diminishes and in a few days disappears.

While the sensation of "mouthfulness" is in evidence, you will not accomplish much with the dentures. In a few days, however, you will be less conscious of having them in your mouth and then you will be able to get better results.

From the fact that you have a foreign thing in your mouth, you will experience an increase in the quantity of saliva for awhile—just the same as tho you were to place a bite of food in the mouth. This increased flow of saliva is perfectly natural and is to be expected. At all other times in the past, you have had a flow of saliva constantly and you have swallowed unconsciously and automatically every minute or so to drain the mouth. The saliva has a definite purpose in our body and its flow and swallowing is natural. When its quantity is increased by placing dentures in the mouth, simply swallow more often for awhile and in a day or two the increased flow will diminish and soon resume normal proportions.

This new denture will be about as serviceable to you as a new bicycle or a new piano on which you have never taken a lesson; you must learn to ride or play upon these things before they afford you any pleasure; and so too with these new dentures. You must not expect full efficiency and satisfaction until you have had time to learn their uses. Some patients become efficient in using dentures very quickly (just as some learn to play the piano very quickly), while others require months to gain the same degree of mastery and—a few never accomplish it.

Remember that in wearing artificial dentures one is in a condition not unlike a man who must depend upon a wooden leg. Such a fellow is better off with it than without it; but he can never again run so fast nor kick as high or dance as gracefully as he did when in possession of his own natural limb.

You will meet some friends who wear artificial dentures who relate wonderful accomplishments "with their teeth." Don't be discouraged because you cannot duplicate their achievements now. Consider first how long they have been in training (how long they have worn those dentures) and resolve that you will do as well or better when you have worn yours as long a time.

There will probably be some sore spots on your gums within a few days. A little adjustment will be required for relief. We must see these spots at once if you would be comfortable. Do not take the denture out of the mouth and allow the spot to disappear but come back so that we can see the exact location that needs adjustment.

Telephone for an appointment whenever a sore spot shows up on your gums; there is no need for you to suffer when a little trimming will probably relieve you. You will make several visits for this purpose during the first few weeks. Then we must regrind the case after it is adapted to the gums.

After two weeks of wearing and adjusting in the mouth, we will regrind the dentures so as to allow the upper and lower teeth to come together better. This will improve your ability to masticate food.

This regrinding and the minor trimming and adjusting mentioned in the preceeding paragraphs is a service that is included in the fee charged for the dentures. All cases need it.

However, after some weeks, or perhaps months, another service may be needed which

is not included in the first fee. If your gums shrink during the healing process, your dentures will become quite loose. They must then be relined to re-establish comfort and efficiency. Shrinkage of the gums is something over which no control can be had. We must simply make the best of it when it occurs. Patients who have suffered with pyorrhea will probably evidence most shrinkage. Some cases show marked changes in a few weeks with continuous change over a period of months; other cases apparently never have any appreciable change and never require relining. For this reason, the charge for relining is made only where such service is required.

Whenever you think the dentures are loose enough so that relining is necessary for tightening, come back for that process.

In bygone days, people had their teeth extracted and then waited months "for their gums to settle" before getting their denture. Such waiting was to give the spongy bone that grows about the roots of the teeth ample time to shrink away or dissolve following the loss of the teeth.

By the surgical procedure we now use, we anticipate nature and remove this process at the time of extracting the teeth and thus avoid the long toothless wait. Immediately after the removal of the teeth and portions of this spongy bone, we proceed to make the dentures and thus avoid the necessity of your appearing toothless among your business and social associates.

Most of our patients are more comfortable by far after this treatment than when we followed the older methods. Your individual case may present some slight variance from the rule or law of averages; but whenever you think that any feature of your case requires our attention, do not hesitate to call us.

No harm will be done by trying to eat with them from the first *providing you will agree not to become discouraged by your first failures.* The chances are that you will not eat with any degree of satisfaction at first; a few do, but most people do not eat well until they have mastered a few tricks relative to the management of artificial dentures.

You will observe that all pressures against the dentures exerted in a line away from the roof of the mouth (or away from the tongue in the lower) have a tendency to tip the denture and loosen the opposite side. This is a mechanical principle that is as old as the law of leverages and cannot be overcome except by your learning to apply the forces in such a way that the direction is toward the roof of the mouth (or the tongue in the lower). With the line of applied force toward the roof of the mouth, your denture is never dislodged.

Keep your dentures in your mouth all the time, except when cleaning them. For cleaning them you may sprinkle them with ordinary baking soda and then scrub vigorously with a stiff brush and water; or you may use any of the cleansing powders or soap. Several plate cleansing pastes are on the market but they have no special advantage over the agents named.

Remove the dentures for thoro cleansing after each meal and at bedtime; otherwise keep them in the mouth day and *night*. Some patients leave them out at night. This practice is not only not necessary but it prolongs the time necessary to grow acquainted with their use and tends to decrease the chances for a good fit. Such a practice also has a damaging effect upon the joint just in front of the ear where the lower jaw hinges.

Successful dentures result *only* from cooperation between a dentist who knows how to make them and a patient who has the necessary determination, persistence, and patience to learn their use.

We supply the first requisite; you supply the latter.

We are just as much interested in your success as you are. We are here to give you the benefit of all the knowledge and experience at our command and it is our constant effort to give all our patients service that represents the very latest approved methods in this line of work.

Every statement we make, every step in technic, is followed by some reaction on the patient. Any physical reaction that our patient experiences during our procedure will soon eliminate itself, but we must watch the mental reaction, the psychological reaction.

No two patients will react in the same way to the same stimulus. Close study will soon disclose your most favorable approach for the case in hand.

I believe fully that it is possible to read character in faces and it is quite possible that a system could be evolved to aid us in further classification of patients by facial shapes.

Last year while Dr. Gysi was in this country he classified dentists into headworkers and handworkers. I believe we might add one other minority group and call them "mouthworkers." This third class succeeds simply by virtue of being

able to employ efficiency from the second class; the first group are even as greatly handicapped and just as dependent upon the second class. The second class probably constitutes the mainstay of the profession, at the present time; but a happy combination of all three qualities would be most desirable.

We have tried to outline one manner of approaching, judging, and educating our denture patients. Let the patient give full expression as to his expectations in denture service; listen to his self-told history of the case; carefully correct any false notions of which he may be possessed; meet all questions with frank statements of facts and avoid promising too much; teach the patient self-appraisal, self-direction, self-control; use a printed statement or a typewritten letter to more effectively impress the necessity of full co-operation, patience, and persistence on the part of the patient; then let your every word and act consistently conform as a fitting fulfilment of the scheme.

After all the thing for which the patient comes to us is *service*. Our success is measured by the quality of the service we render. We can honor our profession only by faithful and honest service: "He profits most who serves best."

Discussion

George Wood Clapp, New York City: Because the essayist has presented only a portion of what I believe to be included in the subject "Denture Economics," this discussion is supplemental rather than critical. It is an effort to show what it costs certain dentists to produce full maxillary and mandibular vulcanite dentures for one month at one time, or to render that portion of the service which they themselves perform. Only average costs can be presented. No dentist should allow these averages to take the place of exact knowledge as to his own costs, but in the absence of such knowledge, they are suggestive.

The information upon which these averages are based was obtained in the following manner. Letters were addressed to the members of the National Society of Denture Prosthetists and to more than three hundred other dentists known to have taken a certain post-graduate course in scientific denture construction. An article was published in the *Dental Digest* asking dentists in general to reply to the same questions. One hundred and fifty-two replies were received in sufficient detail to make them of value.

The first characteristic noticed in these replies is that they can be immediately divided into two distinct groups as to the time required to complete the dentures. And as the quality of denture service is almost directly related to the amount of time spent upon the work, it follows that the two groups of time stand for two distinct qualities of service, one scientific in character and requiring much time, the other unscientific in character and requiring little time.

The time reported for consultation, classification of patients, examination of the mouth, taking of impressions, registering of central occlusion, selection of the form and color of the teeth, arrangement of the teeth, after-adjustment, and the laboratory work was such that in the offices where scientific technic is followed, the making of full maxillary and mandibular dentures for one mouth at one time requires from twenty to thirty hours of work, from the beginning of the examination of the patient to the time when the dentist is satisfied with the results. These reports of from twenty to thirty hours for full vulcanite maxillary and mandibular dentures by scientific technic correspond very closely to the figures in our Research Division, where we estimate twenty hours for the ordinary case, with a little more for the unusual cases. It is interesting to note that about 90 per cent of the reports show the dentists to be following a scientific technic and that in only two practices where the gross receipts are more than $10,000 per year is the unscientific technic followed.

The dentists of the second group are following unscientific technic, including plaster impressions, mash bites, etc. The reports from these offices are not sufficiently complete to show just how much time is required from the beginning of the impression to the completion of the dentures. Such figures as are available seem to show an average total required time of about thirteen and one-half hours, but this is believed to be merely an estimate. It is probably safe to say that in offices where the scientific technic is followed, the time devoted to the completion of full maxillary and mandibular vulcanite dentures for one mouth at one time is from two to four times as great as the time devoted to the production of such dentures in offices where an unscientific technic is followed.

It would be interesting to learn from the reports the actual costs to all the different dental offices for the production of full maxillary and mandibular vulcanite dentures at one time for

one mouth, but, unfortunately, many of the reports make it impossible to show exact total costs. In the one hundred and fifty-two replies mentioned, it is possible to show, at least in close approximation, the cost of the dentist's service at the chair and of the technician's time. These are always the items of greatest cost.

According to the principles of good accounting, the several items of cost, either in the conduct of an office as a whole or of any special form of service in that office, are divisible into three groups; payments for materials, payments for overhead expense, and payments for labor. For our purposes, we can disregard the cost of the materials used for the dentures, assuming that they are identical in all cases, say, $5.20 for the teeth and perhaps $1.00 or $2.00 for other supplies. In most of the reports, the overhead expense is included in the general office expense. There remains to be determined only the amount of direct payments for labor to the dentist and the technician. The reports show that in some cases the chair assistant helps during part of the impression taking, but the reports are not uniform in this particular and it will be better to omit this item.

In order to determine the costs of the dentist's time and of the technician's time, it is necessary to determine the value of the dentist's time per income hour and multiply it by the number of hours he spends upon the case. The value of the technician's time must be determined for each working hour and that sum multiplied by the number of hours he spends upon the case. The sum of these two will represent the labor costs of the dentures.

As these reports were made from income tax reports, it is assumed that the dentist's remuneration consists of the gross office receipts. To obtain the value of his time per income hour, the gross receipts in each report have been divided by one thousand, because, in our present lack of knowledge of business administration, the dentist who can average one thousand income hours a year from the age of thirty-five to the age of fifty-five is believed to be doing well. Thus, if the gross proceeds of the office are $5,000 per year, the dentist's time is considered to be worth $5.00 per income hour. It is evident that if you divide small gross proceeds by one thousand, you get a low value per income hour for the dentist's time, as in the case of one report which showed gross annual receipts of $2,000 per year, which gave $2.00 as the value of the dentist's time per income hour. If you divide high net proceeds, you receive a high value for the dentist's time per income hour, as in the case of one report which showed a gross return of $54,000 for the year. This gave $54.00 as the value of that dentist's time for each of one thousand income hours in a year.

The technician's salary is given in many of the reports and the number of his working hours. These seem to show that technicians average about fifteen hundred hours per year.

One point which is ethical rather than economic enters very strongly into the discussion, namely, that the gross income for a practice is what the dentist has persuaded the people of his community to pay for his services. The difference between a dentist with a low gross income and one with a high gross income may lie in personality, or in location, or in equipment or in skill. It is much more likely to be a difference in business ability than in professional ability. If something about Dr. A leads people to prefer to pay him $10.00 per hour rather than to pay Dr. B $5.00 per hour, it would be difficult to show that Dr. A is not entitled to his $10.00. The most that we can do is to require him to be honest with himself, and to see that he gives to his patients service that is worth $10.00 per hour.

And the difference between economics and honesty brings out points of great economic importance. Competition between dentists for patronage is not a matter of the amount to be charged for the services. Two dentists in adjoining offices, physically separated only by a wall, may be as far apart as the poles as far as patronage is concerned. Take, for instance, two cases from the reports. It costs dentist No. 1, $729.00 to complete full maxillary and mandibular vulcanite dentures for one mouth at one time, because the gross receipts of the office are much more than $25,000 per year and because thirty hours are spent upon the dentures, half of this by the dentist himself. On the other hand, it costs dentist No. 2 only about $11.00 to produce the dentures, because the gross receipts of the office are less than $5,000 per year and he spends only seven and one-half hours upon the dentures. Dentist No. 2 is not a sufficiently good technician to produce, in seven and one-half hours by unscientific technic, dentures equal to those produced in thirty hours by dentist No. 1 and his assistants.

There can be no competition between these two dentists for the work of the same people, no matter how closely the offices adjoin. In fact, the same people are very unlikely to visit the two offices, because the people who can afford the work by dentist No. 1 would not be satisfied with the work of dentist No. 2, and the people who visit dentist No. 2 would probably be unwilling to pay for the services of dentist No. 1. But in many cases where the difference is not so great nor so readily perceptible, dentists are being influenced by the statement that another dentist will do apparently similar work for a certain sum of money.

The principle is that no dentist can be influenced by another dentist's figures unless he exactly duplicates the technic and the living conditions. Let these figures illustrate the point that when a patient tells dentist No. 1 that dentist No. 2 will make full maxillary and mandibular vulcanite dentures for a certain sum of money, the figures mean nothing at all unless she is able to specify exactly what dentist No. 2 proposes in the way of technic and accomplishment. And even then the figures can mean nothing to the dentist to whom they are presented, except for comparison with what he proposes to do and what the service will cost him.

Another fact is quite pertinent. It is not uncommon for a dentist to say: "I get so many dollars for full dentures; is it not a good fee?" No one can answer that unless he has an exhaustive analysis of technic and costs before him. It has been my experience that dentists who ask this question usually do not know whether or not the fee is profitable.

The annual receipts, as shown by these reports, range from $2,000 per year to $55,000 per year. The annual gross expenses range from $250 per year to more than $29,000 per year. The net incomes range from a little less than $1,200 to more than $37,000 per year. It is apparent that averages based upon so wide a range of figures, taken as one group, would be of no value to anyone, because they would be too high for the dentist with the small practice, too low for the dentist with the big practice and would contain many elements not common in the practices of about the average gross receipts. The reports were divided, therefore, into classes at intervals of $5,000. One class contains all practices with annual gross receipts of less than $5,000; the second class those with annual gross receipts between $5,000 and $10,000; the third class those with gross receipts between $10,000 and $15,000; the fourth class those with gross receipts between $15,000 and $20,000; and the fifth class those having annual gross receipts in excess of $20,000.

Class I practices include annual gross receipts of less than $5,000. Thirty-eight practices were reported; average gross receipts, practically $4,000 and the average net receipts, practically $2,500; value of the dentist's time per income hour, $4.00. The report seems to show that these dentists spend an average of five hours' chair time upon each set of full maxillary and mandibular vulcanite dentures, at a cost to the practice of practically $20.00. It is worthy of note that these dentists who have smaller practices than any others in this report take the impression, register central occlusion, and select the form and hue of the teeth in less time than is required by the dentists having larger practices, except in one class, where the average report is unduly affected by reports from two practices. Some of the reports of the laboratory time required were incomplete and others were so evidently inaccurate as to make an analysis impossible within the limits of this discussion.

Class II practices include annual gross receipts from $5,000 to $10,000. Seventy-six practices were reported; average gross receipts, practically $7,000; average expense, $2,600; average net receipts, $4,400. The value of the dentist's time per income hour, practically $7.00. The dentists in this class spent an average of five and three-quarter hours' chair time upon each pair of dentures at a cost to the practice of a little more than $41.00 per case. The reports of the laboratory time do not favor an analysis at this time.

Class III practices include annual gross receipts from $10,000 to $15,000. Twenty practices were reported; average gross receipts, approximately $12,000; average expense, $5,400; average net receipts, $6,600; the value of the dentist's time per income hour, $12.00. Seventeen practices reported the average time required to take maxillary and mandibular impressions, register central occlusion and select the form and hue of teeth. These seventeen average six hours' chair time at a cost to the practice of $72.00. Three reports show that the dentists send out all of the laboratory work or most of it. Seventeen reports show that seventeen dentists do their own laboratory work at an average expenditure of seven and one-half hours' of time, and at an average cost to the practices of $87.00. The reports in this class give the value of the average chair time as $72.00 and the value of the average laboratory time as $87.00, making a total labor cost of $159.00 for the two dentures.

Class IV practices include annual gross receipts $15,000 to $20,000. Eight practices were reported; average annual gross receipts, $17,000; average annual expense, $6,500; average net receipts, $10,500; approximate value of dentist's time per income hour, $17.00. In these eight practices, the dentists average to require five hours of chair time for the taking of impressions, registering central occlusion, and selecting the form and hue of the teeth, at an average cost to the practices of about $86.00. Reports of laboratory time are indefinite in several cases. One dentist reports that he spends one hour of laboratory time. He does not mention receiving any outside laboratory assistance. Another dentist requires twenty hours of laboratory time. The average is about eight and one-quarter hours. Those reporting laboratory time employ laboratory men, at an average cost of $1.20 per working hour. This makes the laboratory labor cost for maxillary and mandibular dentures, under

such conditions, $9.90. In six practices of this group, the average total cost to the practice for labor appears to be about $105.00.

Class V practices include annual gross receipts of $20,000 or more. Ten practices reported. The annual gross receipts in this class range from $21,000 to $55,000. Net receipts range from $8,000 to $38,000; average of the annual gross receipts, $33,000; average annual expense, $17,000 or a little more than 50 per cent of the receipts; average net receipts, approximately $16,000, and the apparent average value of the dentist's time per income hour, $33.00, altho it ranges from $20.00 to $54.00. The dentists in this class report that they average seven and one-half hours' chair time upon each case of full maxillary and mandibular dentures at a cost of from $107.00 to $703.00; the average cost for the class is practically $226.00. Conditions under which laboratory work is done for these dentists make it impossible to report intelligently upon it within the limits of this discussion.

A study of these returns brings out the fact that the financially successful practices show evidence of the existence of much better accounting systems than the smaller practices. It would, of course, not be correct to say that these practices are financially successful because they have good accounting systems, but it is a striking coincidence that the men who know just what they are doing financially are much better situated than those with less complete knowledge.

These figures seem to demonstrate at least three things: (1) that under proper conditions, there is a sufficient demand for the finest of denture work to permit the development of prosthetic practices in which the net return to the dentist varies from $10,000 to nearly $40,000 a year; (2) that the most successful practices, from a financial point of view, are those in which the dentist has developed a very high degree of technical skill and in which he either devotes much time to each case himself or supervises an exact technic in each important detail, and in which technical skill is accompanied by a high degree of business ability; (3) that when the economics of denture service are rightly understood and coordinated with a fine technic, they permit the development of prosthetic practices which are very satisfactory from a professional and financial point of view and are a blessing to all those whom they serve.

Victor H. Sears, Salt Lake City: Denture economics divides itself roughly into three parts: selling, making, and collecting. The essayist has said a few words about selling and Dr. Clapp has considered the making from an economic standpoint. The field remains open for a few words on collecting.

Collecting for dentures is possibly easier than collecting for any other type of dental service, if properly done. This branch lends itself admirably to what is known as the 50-50 plan—50 per cent when the work is begun and 50 per cent when delivered.

It is wise to avoid the impression that the fee is the big thing in the operator's mind and the most satisfactory way for a dentist to collect his just reward is not to ask for it. He may even appear to take little thought of the fee and should avoid suggesting anything about money to the average patient. In all seriousness this is suggested as the ideal position for the operator to assume. Many patients would take advantage of such apparent laxity if they were allowed to leave the office with the impression that no special thought is given to financial matters and that is why the operator's apparent lack of interest in things mercenary must be sharply contrasted by the desire of his efficient office assistant to collect all fees by a very definite plan. The office assistant, altho cheerful and courteous, must be absolutely uncompromising. Her business is to collect fees and she should do so in accordance with good business practice. Only in rare instances should she presume upon the operator's time for the purpose of asking him to give attention to any financial matters for the patient's convenience.

It should be remembered at all times that the fee should have a very definite relation to the service rendered. The operator's economic success demands that he should receive full value for his services—but not a dollar more.

THE ALVEOLAR RADIOGRAM: WHAT IT TELLS

By JOSEPH A. POLLIA, M.D., San Francisco, California

(Read before the National Dental Association, Boston, Massachusetts, August 23-27, 1920)

A LARGE majority of dental radiographers direct their greatest effort toward the reproduction of the tooth, and concentrate in rendering exactness of position, lessening of distortion, and the elimination of confusing anatomical structures as the malar process or the various foramina. In the attainment of this end, the real object of every dental radiogram, namely, the alveolar process is placed in a secondary position and its true radiographic demonstration is more the result of accident than intent.

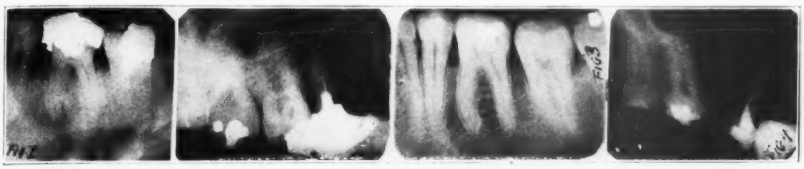
Since the dental radiogram, that is one reproducing the tooth alone has limited diagnostic value, a new type of increased possibilities is required. Such a one is a picture which displays the alveolar bone to the best advantage, as it is this which has the greatest information to the physician and the dentist. Radiograms to check up the work in the various specialties are no exception to the class, for even tho one desires to find out the result of the root-canal work, to locate caries, or to learn the thoroness of the surgery, still the determining factor which decides the next therapeutic step is the condition of the bone beyond the root, either apically or marginally.

There is no radiography that needs to be finer or more exacting than that of the alveolar process. No other part of the body is so difficult to radiograph accurately and is influenced by so many anatomical and technical variations as the mouth. The demonstration of the minute changes occurring around teeth is somewhat more than the matter of good films, correct exposure, and proper angles. It is necessary to have in addition to these, the standardization of every factor which enters into the mechanism of producing the picture.

There are three fundamentals upon which radiograms depend. Experience of course is the first, and of next importance is the equipment; and lastly the dark room. Experience means the knowledge of angles, and a sort of familiarity, so to speak, with one's apparatus that enables the operator to get the most satisfactory results with the particular machine employed. Lest we underrate it, the best possible radiograms cannot be attained without the wholehearted co-operation of the patient, and the factors governing this phase are well known to all. Small units are completely satisfactory for individual needs. There is no department of dentistry or practice of specialty that should be without an X-ray equipment, and it is very hard to understand how results are guaranteed to patients, morally, if not verbally, without it. However, as to those doing radiography for the profession, the best equipment is none too good. Gas tubes give better detail, but a faithful gas tube is in the same class as radium, and standardization of exposure is

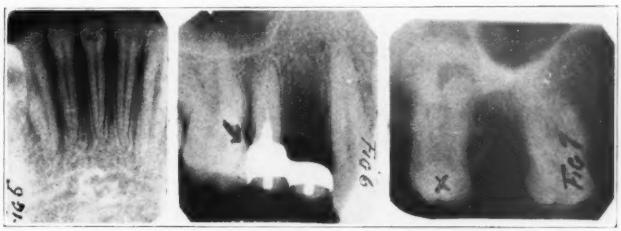
quite important; therefore, the Coolidge outfit is the one of choice. The dark room makes or unmakes radiograms as it is the most prolific source of technical artifacts. It shoud be absolutely light proof, and besides time of development, temperature and ingredients of solutions, the method of development is of utmost importance.

A most grossly neglected requisite has been the proper illumination of the finished radiogram. No less than 75 per cent of men, who in the practice of dentistry use radiography as an aid, study their pictures thru the windowpane. The objections to this are enormous in number, but the most important are these. The light coming from the outside is variable according to the time of day, and season of the year; secondly, it is an exceedingly strong, direct light and necessitates that radiograms be made darker than they should. This is accomplished by overexposure or overdevelopment. Both of these errors erase minute but nevertheless important details. Therefore, it naturally follows that such a picture is less valuable. It is comparatively useless, then, to talk of alveolar radiography, minute changes



1 2 3 4

Figs. 1-4.—Figs. 1 and 2 are radiograms having good tooth detail, but useless for alveolar demonstration; Fig. 3 shows alveolar structure clearly and is termed the "alveolar radiogram"; Fig. 4 is a typical example of the average radiogram made dark for "windowpane" study.



5 6 7

Figs. 5-7.—In Fig. 5 the marked central shows the effect of hyperocclusion or excessive occlusion on the peridental membrane and alveolar process. Note the inflamed thickened peridental membrane (the blackened line around the tooth) and the increased radiolucence of the bone due to the atrophy caused by the trauma. The gingivitis was almost negligible. In Fig. 6 the arrow points to the decalcifying area, the first radiographic indication of caries; at present the spot cannot be clinically demonstrated either with probes or scalers; the pressure exerted upon it by an instrument elicits a dull pain (author's mouth). In Fig. 7 the marked (x) tooth was extracted because of chronic conjunctivitis of same side; the radiolucence at the apex was diagnosed as an "abscess"; the cause of the trouble, clinically verified, was infectious osteomyelitis in edentulous socket mesial to the tooth; the radiolucent area is the infraorbital foramen. Note that the peridental lamella is intact around that tooth. The peridental lamella is also known as the lamina dura.

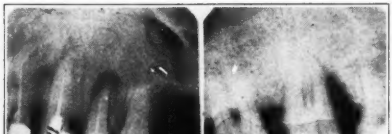
of bone cancellations, and standardization of the operators' methods, if such a primary thing as illumination is allowed to prevent the proper appreciation of those efforts.

The interest in the interpretations of dental radiograms has received a remarkable stimulus of late. With it has come the question of where the radiogram stands in relation to dental or oral diagnosis. Three opinions are prevalent. Some require clinical examination and history before giving an opinion. Another group claim that it is absolutely unreliable except in the grossest lesions. The last division believe in its information so implicitly as to require nothing further upon which to make the diagnosis. In my opinion none of these views is really correct. The ordinary type of radiogram, certainly, does not show everything it could, but the radiogram from which all of the controllable uncertainties have been eliminated as far as is humanly possible and thus brings out the pathological gradations as early as possible—that type of radiogram, namely, the alveolar radiogram, puts before us opportunities of no little advantage. The term "alveolar radiogram" is suggested because it serves to call to mind that the important consideration, in therapy at least, is the bone in which the tooth is located.

8 9 10

Figs. 8-10.—Fig. 8, cancellations in normal maxilla (age, twenty-five); Fig. 9, cancellations in normal mandible, especially around second bicuspid (age twenty-five); Fig. 10, normal mandibular cancellations (age, sixty-two).

I believe that the future of dental radiography depends on the consistent demonstration of the disease in the early stages. When a pathological process has resulted in the alteration and destruction of a large amount of the involved tissue, the chances for permanent cures outside of removal are few, and then only under the most favorable conditions. I have been able to see in the radiogram inflammations of the peridental membrane from hyperocclusion a year before the patient came to the dentist for treatment of the gingivitis and pyorrhea. Spots of increased radiolucence on the enamel, the sites of future caries, can be seen in the radiogram at least six months before they are revealed by the exploratory probe of the dentist.



11 12

Figs. 11-12.—Cancellations in pathological process: Fig. 11, destructive, so-called rarefying; Fig. 12, regenerative, so-called "sclerotic." Note the ill-defined structure and its homogeneity in both cases.

If alveolar radiography can but stem the inroads of pyorrhea alveolaris and caries by enabling the profession to recognize them at a period when the treatment is easy, it will mean more to the human race than the service it gives for the detection of dental foci. That this is possible I have no doubt, provided a *simple standardized technic,* such as I have in mind, that will enable the *average* operator to consistently demonstrate these early changes can be taught in the colleges in dentistry—not to make radiographers of the students, but to enable them to get good radiography. To get good radiography, it is necessary to demand good radiography, and to demand good radiography, one must know what

filling, I often feel quite uncertain as to its diagnosis, and am relieved at operation only where it is found that disease was present. Very often a really dangerous unhealthy area occurs around a tooth, which shows no dental interference, that is, no root-canal therapy, or caries, or trauma or any of those leaders which tend to point to the correct finding; this type of disturbance is often wrongly diagnosed because none of the above-mentioned helps are present to lean on.

A radiographic variation in density may mean a dark shadow, more correctly termed a radiolucence, or a white shadow, more properly called a radiopacity. A picture presenting an area

13 14 15 16

Figs. 13-16.—In Fig. 13 the darker spots are due to loss of calcium salts. Note how they contrast with the normal darker areas. In Fig. 14 the large whiter area beneath the black spot is due to the morbid regenerative changes causing the increase of bone formation. In Fig. 15 the normal peridental membrane is represented by the fine black line and the normal peridental lamella, by the fine white line. Note the "tailored-like" fit of the lamella. Fig. 16 shows the lamella and membrane in an almost normal state. Note that both lamella and membrane are somewhat thicker than in Fig. 15.

good radiography is, what it should show, and upon what principles it depends.

I have no doubt that not a little of this misunderstanding about the value of the radiogram and its reliability are due to poor radiography. There seems to be an almost universal disregard for the finer variations from the normal spoken of above and illustrated by Figures 5 and 6. Only the gross lesions are recognized, and then unless in relation to other known pathological influences, such as extensive caries, or a root-canal

of increased radiolucence around the apex of a tooth is interpreted in different ways by different observers. The different opinions do not destroy the radiolucence, and neither does it mean that radiography is unreliable because men do not agree as to the findings. The radiogram portrays all that has been projected upon it, no more and no less; it is we who must study it closely to determine what has been projected, and if abnormal why it is so.

To study pathology without first having a knowledge of histology would be

unwise. To attempt to recognize a carcinoma of the stomach microscopically without first having a mental picture of the normal epithelial layer is not commendable to say the least. Yet the number who attempt to read radiograms and point out the pathological variations and still are unable to describe or definitely state the normal is appalling. The very fact that the study of the attributes of normal alveolar process seen in the radiogram has been neglected explains why many teeth which are actually diseased with diseased perialveolar bone tissue have been overlooked much to the patient's detriment. On the other hand many pulpless teeth having nothing but the projection of a foramen at the apices have been extracted much to the patient's loss (especially if it is a strategic tooth, like a central) and the dentist's silent anguish.

17 18 19

Figs. 17-19.—Fig. 17 shows separation of the lamella in the destructive type of bone changes; Fig. 18, separation of the lamella in the morbidly regenerative type; Fig. 19, destruction of the lamella at apex of bicuspid in an area of bone destruction due to bacterial activity; dentist in this case knew that the bicuspid was all right because it responded to thermal tests, and he desired to know the condition of molar. A surgical operation resulted in removal of all bone to tuberosity, with portion of antrum floor.

The normal alveolar process, when radiographed under conditions of proper angulation and standardized technic, has two distinct features, based upon the normal anatomical structure and chemical composition of the bone. They are irregularity of the cancellations and harmonious blending of the lights and darks of the picture. The irregularity of the cancellations means that the spaces which form a feature of spongy bone are irregular in size and shape. Spongy bone, it will be remembered, is made up of bone lamellae, the units of bone structure. These lamellae instead of being laid down in an orderly manner, as is the case in the compact bone, are arranged in a haphazard manner. These groups of disordered lamellae form strands of bone tissue, which unite and in uniting form *irregularly* shaped cavities. Therefore a picture of the structure of spongy bone, if normal, will show the white lines, thin and delicate (the strands of bone tissue), inclosing dark or black areas, no two of which are alike, the irregularly shaped cavities. In a normal alveolar process, notwithstanding what has been said to the contrary, *no matter how old the patient is, this irregularity is still maintained,* provided the patient is not suffering from systemic or extensive alveolar disease. As age advances the percentage of calcium salts in the bones increases. This renders the strands of bone tissue (the fine, delicate white lines) more distinct, but if the bone is healthy, the cancellations are irregular (see Fig. 10). The cancellated structure or filigree work is finer and more definite in the mandible than in the maxilla, because in the lower jaw the angle of penetration is more direct than in the upper.

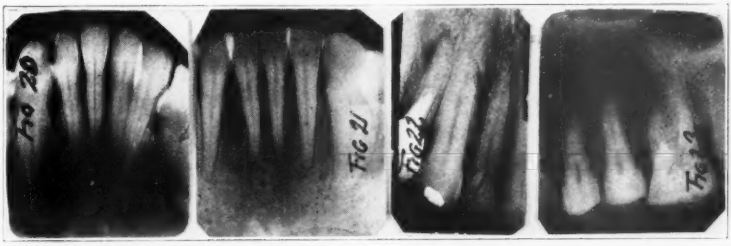
When injurious influences affect the

bone the cancellations lose their clean-cut borders, become smaller, and closer together. I am not aware of any exception to this observation anywhere in the body. Therefore whenever the cancellated structure tends to become regular, ill-defined and homogeneous, pathological processes are taking place at that point.

The calcium salts present in the bone act as obstacles to the passage of the X-rays. This permits the recording on the sensitized emulsion of areas of different resistance to the projection of the ray. It is obvious, then, that a radiogram of the alveolar process is mostly a reproduc-

ized or discreet areas of darker or whiter tones producing the harmony of shades. I know of no bone disturbance which is radiographically demonstrable that does not affect the peculiar irregularity of the cancellated structure and disturb the normal amount of calcium salts of the abnormal area.

The importance of these two points can be appreciated by a little reflection. They are the only means at present known whereby pathological bone can be recognized, under circumstances where doubtful elements operate, such as infectious areas under vital, but diseased teeth, and radiolucent areas under teeth



20 21 22 23

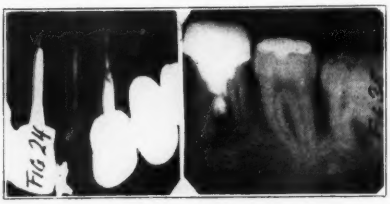
Figs. 20-23.—Fig. 20, typical disuse atrophy in a woman over sixty years of age; these teeth never occluded; there is an almost thoroly complete absorption; note the vascular channels and convex incisal edges. Fig. 21, disuse atrophy in boy of twenty; note the same peculiar radiolucence and incisal edges. Fig. 22, traumatic atrophy at its most frequent site, the lateral; the radiolucence extends around the entire tooth. Fig. 23, traumatic atrophy around bicuspids, with same characteristics; in both Figs. 22 and 23 the signs of attrition on incisal surfaces are seen; note that they are concave instead of convex.

tion of calcium salt content. If thru any influence these salts are diminished in a certain area, the rays will pass thru more easily and, in affecting the emulsion, more deeply produce a darker spot. If the amount of the salts is increased, by any harmful factor, the rays will be hindered from passing thru, thereby affecting the silver on the film less deeply and the result is a whiter spot. In the normal process there occurs no increase or decrease in resistance to the passage of the rays, except in a well-balanced manner; therefore, in a process free from pathological change, there are no local-

showing no signs of dental interference. Areas of old extractions are by no means all normal under the radiographic ray and are oftentimes the exciting factor in many systemic cases, where the eminent internist smiles tolerantly as he tells the enthusiastic dentist that the teeth were extracted years ago. This was pointed out by Novitzsky in 1918, and I have verified it repeatedly, radiographically and clinically.

The normal tooth presents also two characteristic features radiographically. Outside of the cemental border there are two lines, a fine black line, the peri-

dental membrane, and a fine white line, the so-called lamina dura. The peridental membrane is a soft tissue and,



24 25

Figs. 24-25.—Two examples of atrophy from chemical influences.

therefore throws no radiopaque impression; it is represented by an even black thread surrounding the tooth from the cemento-enamel junction of one side to the cemento-enamel junction of the other. It is normally slightly thicker at the cervical portion of the root than elsewhere. Immediately beyond the peridental membrane lies a thin layer of compact bone which forms the outer edge of the alveolus, and which is pierced by numerous openings for attachment of the fibers of the peridental membrane; because of this it was named by Noyes the cribriform plate. Because there are two other bone areas of the same name in the head, namely, the cribriform plate of the ethmoid which separates the anterior cerebral fossae from the nasal cavity, and the cribriform processes of the temporal bone, it seems to me that a third cribriform item is somewhat confusing. Various radiographic writers have called it other names, such as the linea dura, lamina dura, stratum durum, etc. These names mean absolutely nothing in the anatomical sense, and have no relation to the peculiarity of the structures. Texts on anatomy are filled with such terms, whose only excuse for existence is habit. For this reason, I have taken the liberty of renaming it the peridental lamella, meaning the thin layer of bone around the tooth.

The peridental lamella of a healthy tooth has also the same thickness all the way around; besides it fits the tooth perfectly. As long as there are no aberrations of contour, and the lamella does not sag at any point, *the tooth has no relation to the radiographic variations of density in its vicinity.* The reason for this is simple. The lamella is the closest bony structure in relation to the tooth. It lies between the tooth itself and the

26 27 28

Figs. 26-28.—Fig. 26, typical pericementomata, which has dissolved lamella. What is here seen is not the pericementomata but the bone it has destroyed in growing. Fig. 27, pericementomata whose products extend beyond it, causing bone destruction in two directions. Fig. 28, the true cyst.

alveolar mass outside. Therefore any pathological process originating within the tooth must alter the integrity of the peridental lamella or destroy it entirely at the point of incidence before it can reach the cancellous portion of the alveolar process.

The peridental membrane, being the first of these tissues to come in contact with the injurious element, naturally is the first to show abnormality. In the radiogram this is indicated by a thickening of the fine black line at the point of irritation. This thickening is due to the hypertrophy of the peridental membrane, another type erroneously called the sclerotic, which is only defensive in 25 per cent. It is an unknown factor which induces a destruction in one case and a morbid regeneration in the other. However, the thing to be made clear at this point is that in the beginning, both start in the same way, namely, irritation, thickening of the peridental membrane at the point of irritation, and separation of the peridental lamella at the injured spot.

The peridental lamella was first pointed out to the profession, by Leland Carter in the *International Journal of*

29 30 31 32

Figs. 29-32.—**Fig.** 29, atrophy infective. Note that it lacks the clean-cut circumscribed aspect of the pericementomata, but is confined to the apical region. Fig. 30, traumatic atrophy here involves the whole area, because the tooth is the irritant. Fig. 31, infective hypertrophy. This radiogram shows the separation of the lamella, the dense bone formation, with the marked radiopacity. Fig. 32, hypertrophy traumatic. Note that the involvement extends around the entire tooth area, similar to the atrophy (arrow points to the beginning involvement at the bifurcation, sign of alveolar absorption extending in spite of increased bone formation).

which pushes out the peridental lamella at that place and makes it sag. Since the thickening of the membrane is caused by the chronic inflammatory reactions which are present, a thickening of the fine black line anywhere along its course is the sign of an inflammatory process or a pericementitis. As the pericementitis increases in severity, the membrane becomes thicker at that point, the lamella is pushed farther out, and then something peculiar happens. Altho every dento-alveolar disease starts as a pericementitis before it spreads to the alveolar mass proper, still not all are of the destructive, or rarefying type. There is

Orthodontia (July, 1917). He describes a white line of demarcation which is intact around normally disposed teeth. As important an item as this is, it has been overlooked with a consistency bordering on defective vision.

There are present in a normal alveolar radiogram four features which aid in determining the health of the part; those occurring in the bone are irregularity of the cancellations and harmonious blending of the lights and darks of the picture; those occurring around the tooth are the fine even black line (the peridental membrane) and the fine even white line with the "tailored-like" (the

peridental lamella). Radiograms should be inspected for the presence of these structures, and I do not hesitate in saying that it is possible to demonstrate them in nearly all teeth, provided care in sighting angles accompanies the work. It is not necessary to show them in every case, around every tooth, but they are very important around suspicious ones.

The Meaning of Radiographic Variations in Density, Pathologically

Many variations in density are noted in examining pictures of the teeth. They are of two kinds; the anatomical and the pathological. In the anatomical the application of the four principles explained above should in a good alveolar radiogram be sufficient to identify them. It is with the pathological changes that one is most concerned. How many teeth are daily extracted because the meaning of a radiographic alteration in density is not understood will never be known. Teeth really are important organs and their loss is not to be lightly taken, no more lightly than the removal of a finger. The loss of a single tooth does not mean *the loss of one thirty-second of the masticatory surface of that mouth, but it lays the foundation to the destruction of the entire masticatory efficiency of the individual.*

Unfortunately for the patients a variation in the radiogram which is due to excessive occlusion appears the same radiographically as does one due to infection. In the first the tooth can be retained with the proper remedial measures instituted, while in the second the chances for satisfactory retention are doubtful. There is no such thing as the monopoly by one influence of a specific kind of radiographic abnormality. Infection can produce radiolucence as well as radiopacity. Various severe chemical reagents, such as acids and alkalies, produce alveolar lesions which in the radiogram present the same appearance as the so-called apical abscess. It is necessary to regard all differences from the normal, however slight they may be or of what characteristics they are composed, with suspicion, and it is the work of the dentist to determine whether the activity underlying the change is injurious to the patient. The radiogram does not tell whether a process that it indicates is harming the one who carries it. Clinical examination and a few selected questions pertaining to his or her well-

33 34 35

Figs. 33-35.—Fig. 33, defensive hypertrophy. This example illustrates the atrophic condition at apices surrounded by the dense new abnormal bone. Below lies the inferior dental canal, whose lumen is being already narrowed by the process. Complaint in this case was trismus with continuous neuralgia extending into the ear. Removal was followed by relief to date (eighteen months ago). Fig. 34, eburnation. This is a very dark radiogram; it is fortunate to have had even this, as condition is so rare. Arrows point to lesion at apex of second bicuspid. Fig. 35, hypertrophy thermal. Arrow points to the small apical mass. Note large inlay. This case had characteristic sensitiveness to heat and cold. Relief followed removal of inlay.

being are necessary and, if a serious doubt arises, any medical diagnostic aids within reach of the dentist as well as the opinion of a good physician, who can give the desired information, are very helpful.

As has been noted above the harmonious blending of the lights and darks found in pictures of the normal process depend upon the balanced distribution of the calcium salts. This distribution depends ultimately on the nutrition of the part. The reason for this is that there is no absolute increase or decrease of the calcium salts in the areas showing radiographic change. An area of increased radiolucence is not the result of decrease of the calcium salts alone, but the diminution of the bone units or lamellae. On the other hand, an area of increased radiopacity is the result of an increase in the number of bone units and not of the salts. It is clear why the term sclerotic bone is not correct because sclerosis implies hardening due to the deposition of calcium salts or connective tissue, without specific tissue increase.

The nutrition may be modified in two ways: first by lessening it, and second by its increase. Lessening of nutrition in the bone induces absorption of the lamellae, which are replaced by connective tissue and vessels of various forms. This can be brought about by five influences: (1) disuse, (2) excessive use or trauma, (3) chemicals, (4) pressure, and (5) bacteria. Let me repeat that radiographically it is impossible to differentiate from the changes in the *affected* structure itself which of these influences is operating. This is determined by other means, such as the location of the lesion in relation to the root, the presence or absence of dental interference, history, clinical examination, etc. The absorption of the lamellae diminishes the resistance to the passage of the rays that affects the silver in the emulsion more deeply and produces the darker spot. This will be referred to from now on as increased radiolucence. Since radiolucence indicates pathological influences, which have diminished nutrition of that part, the term atrophy is suggested to take the place of rarefaction.

36 37 38

Figs. 36-38.—Fig. 36, retained pericementomata; Fig. 37, retained cyst; this was mounted upside down and "diagnosed" as portion of the antrum; Fig. 38, retained root fragment.

Radiopacity is the result of the deposit of more lamellae; it must therefore have for its underlying factor a morbid increase of nutrition. There are also five causes, which are (1) infection, (2) mechanical trauma or excessive occlusion, (3) thermal shock, (4) defensive reaction, and (5) an unknown influence which produces a very dense compact bone change which has no Haversian canals nor Haversian system and which is analogous to the eburnation found in the mastoid. It is curious that hyperocclusion produces atrophic changes around the single- and some of the double-rooted teeth, whereas in the molar region hypertrophic types are noted. I

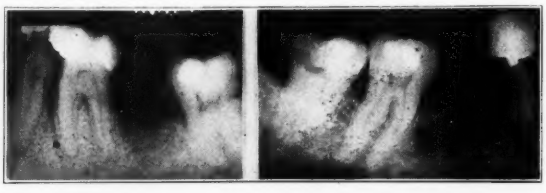
believe that this is due to the excessive movement which single-rooted teeth have in malocclusion, producing the osteoclastic activity described by Talbot. In multiple-rooted teeth the same force which would move a single- or double-rooted tooth a great deal, only produces slight mobility in them; instead of being destructive this would be constructive to the surrounding bone.

Eburnation is the only true exostosis found around the teeth. The term exostosis is incorrectly applied to areas of increased cementum noted anywhere along the root. Since this is a cemental process, the word hypercementosis is the correct one. Exostosis implies a new growth of *bone* which is circumscribed and due to osteoblastic influences.

It is difficult to understand why so much has been written about dental radiographic interpretation and how little of it is based upon microscopical data. Sclerotic bone, if it were truly such, would have an absolute increase of calcium salts. This makes bone more brittle. However, hypertrophic type of change is by no means a brittle one, as it imparts to the bone instruments used in its removal a sensation not unlike India rubber to the back of a knife. Microscopical examination of atrophic areas reveals the loss of bone tissue, no matter how small the lesion is, and should imply the true nature of its cause.

Based upon the foregoing reasoning and findings, I beg leave to offer another contribution to the already voluminous number of radiographic classifications. In order that the new terms "atrophy" and "hyperatrophy" may not mislead, as they have been used heretofore to indicate gross organic changes, I wish to say they do not imply the process which they describe as affecting the whole of either side of the upper or lower jaw. They merely refer to the localized and immediate areas involved.

Below is the classification. The word "dentulous" from the Latin *dentatus* is used to indicate processes around the teeth, and as disease does persist after teeth have been removed, a separate division under the main heading of atrophy and hypertrophy must be made, classified as the edentulous.



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Figs. 39-40.—Examples of atrophy persisting after extraction; infective nature verified microscopically.

Dentulous localized alveolar atrophy

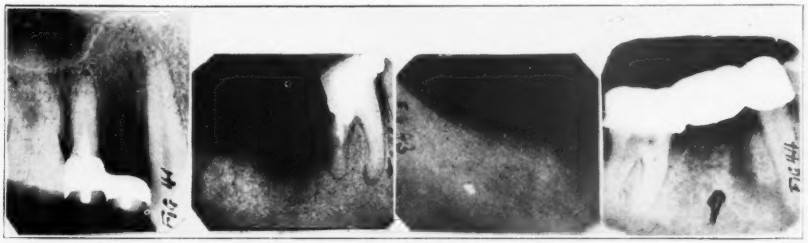
1. Disuse, where teeth have no opponents
2. Mechanical trauma, around single- and some double-rooted teeth, from excessive occlusion or hyperocclusion
3. Chemical, from the disintegration by harsh reagents, and filling material in root-canal therapy
4. Pressure, caused by the forces exerted in the growth and expansion of
   a. Pericementomata (so-called apical abscess, granuloma, and "hickey")
   b. Cystic pericementomata
   c. True cyst

5. Infective, from bacterial influences

Dentulous localized alveolar hypertrophy

1. Infective from the presence of bacteria
2. Mechanical trauma, found around the molars and some of the bicuspids subjected to hyperocclusion
3. Thermal shocks, in the beginning before pulp degeneration has occurred.
4. Defensive, secondary to an atrophic infective process
5. Unknown, producing eburnation
3. Eburnation, which is often overlooked especially because of its very hard structure, and where teeth are extracted without having had radiograms

Just a word to elucidate this nomenclature a bit further, so that the chances for confusion will be less. Under the atrophic dentulous changes, disuse appears as the first subdivision. This is an increase of radiolucence found in the regions of the alveolar process wherein the teeth have no occlusion or no opponents. It will be remembered that the



41 42 43 44

Figs. 41-44.—Fig. 41, atrophy edentulous beneath bridge tooth extracted in 1913 (author's mouth); Fig. 42, hypertrophy edentulous, probably defensive; Fig 43, edentulous hypertrophy defensive around a metallic foreign body; Fig. 44, edentulous hypertrophy beneath bridgework, lying between two atrophic areas, one of which is a fistulous tract.

Edentulous areas

Atrophic changes:

1. Chemicals, from cauterizing with silver, phenol, etc., after extraction to insure sterility
2. Pressure from retained pericementomata and cysts
3. Infective, from retained root fragments, poor surgery, and lowered local resistance, which prevents proper healing

Hypertrophic changes:

1. Infective, from bacterial activity persisting after extraction
2. Defensive, from the reaction against bacteria in a retained area of infective atrophy

extraction of teeth that have not functionated for many years is easier and the bone has a much softer texture, almost putty-like. I have heard it spoken of as infected, but that is incorrect, as bone atrophies in the same way as any of the softer tissues when it does not receive the trophic impulses accompanying function.

Atrophy of the process is noted around teeth with single roots, and some bicuspids, that are struck by the occlusal force either too heavily or not at the point of greatest support. Of the teeth most commonly afflicted with this condition, the lateral is by far the most frequent. Perhaps this is the reason why large cysts

are most often found over this tooth; and it is rather peculiar, in spite of the lateral being a single-rooted tooth, with the canal straight and accessible, that root-canal therapy is in so many instances disappointing. This may also be accounted for by the injury to the tooth and structure surrounding it, by the malocclusion.

Chemicals are just as destructive to the alveolar bone in the body as they are in vitro. Unless they are used with a discretion worthy of their disintegrating capacities, more bone is destroyed thru their use than thru the original pathological process. Then, again, the presence of root-canal material in the alveolar bone is the presence of a foreign body. Innocuous as the foreign body may be to the majority of patients, still we find a small number whose bone tissue of that region does not tolerate it, and an atrophy follows with the typical radiolucence at the point of injury.

The granuloma, apical abscess, or "hickey" and the cysts, true and psuedo, are the most familiar of the dento-alveolar lesions. These are so plainly visible that even the patients themselves are quick to detect their presence. I prefer to call the granuloma, apical abscess or "hickey," the pericementomata. I have been unable to see in the two hundred specimens which I have examined microscopically anything that resembled true granulation tissue with its tuft of vessels or any cellular evidence of active infective nature, except a few leucocytes of polymorphonuclear variety and many round cells, which, however, are not the sign of chronic infection, but chronic *inflammation.* Bacteria are only one of the many influences capable of producing inflammation, but it is with extreme regret that I note how loosely these terms are used. Very few realize that inflammation and infection are *not* synonymous, and until we learn to differentiate them, the harm which is capable of being done is great, especially in the report of cases and in original studies.

The peridental membrane, under the constant irritative influence of the streptococcus and its products, becomes chronically inflamed and thickens at the affected point. The enlargement of the membrane in the beginning pushes aside the peridental lamella, forming the separation spoken of before. As the membrane increases in thickness the pressure exerted is increased and the lamellae, if thick, are carried with it. If it is frail then it is broken thru. Whether it is the first or second of these conditions, it is the pressure of the growing process upon the surrounding bone which is responsible for most of the bone destruction, not the infection. However, there are some of these pericementomata which contain virulent and active organisms, the products of which permeating or breaking thru the walls, affect the bone also. In these there are obviously two distinct processes, the atrophy from pressure and that from the secondary bacterial influences. There are many examples of pressure atrophy occurring elsewhere, as the erosion of the sternum from an aneurysm.

As pericementomata are benign tumors of the peridental membrane, which receive their nutrition from the periphery toward the center, they undergo central necrosis and liquefaction at the points wherein the nutrition fails. This gives rise to the cystic degeneration of the pericementomata. This type of pathological process has been confounded with the true cyst, an entirely different entity. The presence of fluid in these cystic changes is probably responsible in a general way for the origin of the term "apical abscess."

The true cyst differs from the cystic pericementomata in that it has an epithelial lining. Small cysts are identical

with cystic pericementomata, but later, in the radiogram, the cyst becomes larger and larger, whereas the other rarely does because it tends to become connected with the mouth, thru a fistulous tract. Practically speaking any area which has dissolved the bone to an extent in the radiogram greater than three-eighths of an inch in diameter is probably a cyst.

Atrophy from bacterial activity has purposely been placed last for no other reason but to remind us that not all areas of radiolucence are due to their presence. Various names have also been applied to this condition, such as rarefying osteitis, alveolar osteomyelitis, and others. This condition is by far the most dangerous of all the atrophies because it is found in the edentulous sockets, and around teeth which themselves have apparently no radiographic evidence of disease. Having no distinct line of demarcation, the process is unhindered and may involve portions of the bone far remote from the source. In short, any area of increased radiolucence located around the apex, and at some point on either the distal or mesial margins of the tooth root, and having with the increased radiolucence a regularity of loss of cancellations belongs to this type. The differentiating points between traumatic atrophy and this one are principally of location, the traumatic being around the whole tooth from the mesial, along the root to the apex, down the root on the distal side. Together with the position it may be found that in the malocclusal the lamella is intact, and the incisal surfaces show attrition.

In the hypertrophic type of bone change, there is present almost the same factors with the exception of chemical and thermal, each being peculiar to one or the other, the chemical always has been observed under atrophy and the thermal as a hypertrophy. The most interesting as well as important of the class is the infective, because there is the impression that this type of change is a sign of resistance. The bone under the microscope shows the bacteria well enmeshed in the layers of lamellae, and clinically this type in the surgical consideration is the most intractable and hardest to heal after operation. Cases that are clean of dental foci as far as the atrophic areas are concerned show little temporary relief or none at all when these types of areas are allowed to remain, but show remarkable improvement after their removal. Next in importance is the fact that this abnormal process is progressive, and unless the exciting factor is removed the bone continues to accumulate until it presses upon some vital structure, like the inferior dental canal, and produces serious symptoms.

The traumatic form has been explained above as occurring in the regions around certain few bicuspids, but very commonly around the molars. This type when recognized in its typical location, will very often aid in the correct diagnosis of a stubborn alveolar absorption, that seems to resist the most conscientious treatment.

In the beginning period of their effects, heat and cold when transmitted thru the medium of a close metallic filling produce a small area of hypertrophic bone at the apex. This has been called thermal hypertrophy, and is the only other pathognomonic type of radiographic change. Briefly, any area of hypertrophy, found in the region of the apex, accompanied by the usual sensitiveness to heat and cold, and possessing the usual large metallic restoration, belongs to this class. When the pulp has died then this hypertrophic change becomes superseded by an atrophic one so that the inner part is one of increased radiolucence, and the other of increased radiopacity.

Defensive hypertrophy is numerically

the most important of the hypertrophies. It is probably bacterial in origin, but is differentiated from the infective by the fact that the hypertrophy follows the already existing atrophy, whereas in the infective the hypertrophy is the initial and only existing process. The same danger arises from the neglect of this type as does with all the other, namely, that it may at some future date produce an impingement on vital structures.

Eburnation is very rare. I have seen only four examples in over three hundred thousand radiograms examined. It is important only as a pathological entity, and as the only true exostosis occurring in the alveolar process in relation to the tooth.

The edentulous classification is almost self-explanatory. Just a word, in its regard. This condition was first pointed out by Joseph Novitzsky in 1918, and has been very sadly overlooked. I am conducting some experiments at present which seem to indicate that it is rather a serious problem. Both types have been found to exist, and the report will contain some startling deductions.

The atrophic regeneration is by far the most frequent type found in the sockets, radiographed and sectioned, not *less* than two years after extraction. At first the explanation that the socket atrophies after disuse would be satisfactory, except that it occurs just as regularly under bridges and dentures. Under bridges, the atrophy seems more pronounced, no doubt due to the accumulation of food, which causes inflammatory reactions in the mucous membrane and affects the bone beneath.

The most spectacular finding is the retained pericementomata or cyst. These are easily discernible, and need no further mention.

Areas of infective atrophy sometimes are very important, as they may be the site of abundant toxic absorption, and every case of radiographic examination is certainly incomplete without a thoro investigation of the sockets where teeth have been.

No edentulous or post-extraction changes are noted when the loss is due to trauma, disuse, or thermal influences, because with the removal of the tooth the irritant is no longer present and consequently, the tendency is to return to normal. In the hypertrophic, the defensive is rather one to be looked after, as it has the same accumulative properties as when it is found around the tooth. The infective is also found, but not so frequently as the atrophy. As has been explained in the classification, eburnation is rare, and because of its density it is overlooked, the operator being misled by the hardness into believing it is normal tissue.

A word about tumors. They manifest themselves in the radiogram either by radiopacity or radiolucence. Some have both, so that their place in this classification is between the atrophic and hyperatrophic divisions in the dentulous and edentulous headings.

Summary

1. Dental radiography as practiced at present has a limited diagnostic value because the alveolar process is indistinctly reproduced, due to the desire on the part of the operators to reproduce the tooth as exactly as possible.

2. The alveolar radiogram is suggested as the name for the radiogram which will concentrate on the bone tissue reproduction, and which is the result of standardized technic and will render visible minute changes that give more information and enable better disposition of the case.

3. Improper illumination is a very important factor, because most radiograms are studied by the windowpane,

which necessitates darker radiograms that do not show all the changes in the tissue.

4. The uncertainty over the value of radiography in dentistry is due not to the radiogram but to the kind of radiography. Good radiography has many advantages besides being the indicator for the extraction or retention of teeth; namely, in the prevention of disease extension by enabling the dentists to recognize it before it has spread far enough to be a difficult therapeutic problem.

5. The future of dental radiography depends on the consistent demonstration and recognition of early disease changes in the teeth and their alveolar processes.

6. There is too little familiarity with the normal alveolar process, and the normal peridental structures, as they appear in the picture.

7. Normal process has irregular cancellations based on their histological structure, and harmonious blending of the lights and darks due to the balanced distribution of calcium salts.

8. Pathological process tends to destroy the irregularity, producing homogeneity, and alters the harmony of shading, in all cases.

9. The normal tooth has two structures, the peridental membrane and peridental lamella, the relationship of which is disturbed by the slightest pathological activity. These form the guides in the determination of the relation of the tooth to the alveolar variation in the radiogram.

10. New classification of radiographic changes is based upon the changes in nutrition, which all chronic processes affect sooner or later, and which determine the type of abnormality.

11. There is a necessity for determining the cause of radiographic variations as they may aid in saving the tooth in question from extraction; there are no ways of determining by the character of the radiographic lesion if the individual's health is being affected.

12. Thoro radiographic examination of the edentulous sockets should be a routine procedure as they show abnormality with consistent regularity.

THE BASIC RELATIONSHIP OF ORTHODONTIA AND PERIODONTIA

By PAUL R. STILLMAN, D.D.S., New York City

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

FOR many years the orthodontist has been intent upon the correction of malocclusion. On the other hand the periodontist has been intent upon the cure of disease in the investing tissues of the teeth. The former specialty, under the guidance of Angle, has sensed the part they are playing in the prevention of dental and periodontal disease. Black has also called attention to the importance of orthodontia as a preventive of disease.

The late developments in periodontia have now brought us to the point where we recognize derangement of the occlusion as one of the most important factors in the causation of dental periclasia. And we further are finding that our efforts to effect a cure of this condition are of little avail, unless the deranged occlusion can be correctly rearranged. The periodontist now bases his pathology upon disturbance of function, thereby bringing his conception of pathology into harmony with the accepted pathology of other parts of the body. All honor to Angle and Black who also built better than they knew. Their conception of the part which orthodontia would one day play, in preserving the health of the mouth, was prophetic.

It was my pleasure to observe the modus operandi of this section, at the meeting held in New Orleans two years ago, as well as at Boston last summer. It was observed that when a paper on orthodontia was to be presented, the orthodontists flocked in and the periodontists flocked out. Also, when a periodontia paper was in order the audience consisted chiefly of periodontists. We appreciate the fact that many papers in orthodontia deal with problems which appear to the periodontist as having but little of interest for him. Likewise the orthodontist may, on the face of it, seem to find little in the periodontia papers which will be thought to be of value. However at the New Orleans meeting my belief in the fundamental interdependency of these two specialties, impelled me to attend the entire program of this section. It was a pleasure to find that a periodontist could learn just as much from the papers on orthodontia, as from those dealing with his own specialty. It may not be amiss to state, that because of recent developments in periodontia dealing largely with the subject of occlusion, the orthodontist should likewise find much in interest and of practical value to him, in periodontology. The orthodontist whenever he treats a case is at once dealing with potential

disease; frequently with actual incipient disease of both the hard and soft tissues. His interest in prophylaxis is of the instant, from the standpoint of his case as well as for self-protection. He must be alert, and his efforts directed toward the future as regards the continuing health of the patient's mouth.

It may startle some of the orthodontists present, if the statement is made, that the orthodontist may learn something of value on the subject of occlusion, as well as prophylaxis, from the periodontist. Nevertheless I believe this to be a fact. Dentists have presented themselves at periodontic clinics, and have made the statement, that well known orthodontists have passed upon their mouths as exhibiting a normal occlusion. Yet in these mouths have been observed gross departures from normal occlusion, with an accompanying in.co-ordination of function. And these same mouths have exhibited definite symptoms of incipient, as well as advanced periodontal disease.

In prophylaxis, no branch of the dental profession has the power to accomplish so much as has orthodontia. Its mission to humanity is the establishment of dental function and the prevention of disease. It is an established fact, that health depends chiefly upon normal function. Without orthodontia, health would be an impossibility in the mouths of many individuals; since in the absence of normal occlusion, dentistry is powerless to accomplish satisfactory results. The field of the orthodontist is not, however, limited to the mouth alone. We all know the influence which health or disease in the mouth has upon the rest of the body. To maintain the health of the oral tissues is a big factor in the prevention of general disease, and it is a service to the patient whose influence will be felt thruout life.

The orthodontist, in addition, has a more direct opportunity. The large majority of his patients present for treatment during the years of rapid development, and at an impressionable period of their lives. Then the inherent desire for health may be fostered most readily, and the ideals of correct living may be readily instilled. The orthodontist who has the spirit of the physician and who is not completely absorbed in the technic of his art, will avail himself of this golden opportunity to serve the future rulers of this nation.

Like the orthodontist, the periodontist is vitally interested in the biologic problems of the tissues around the teeth. They must remove the causes of disease before any return to health is possible. But even after this has been accomplished, in many instances, steps must be taken to arouse nature's regenerative impulses, before he may obtain satisfactory results. And it is in the field of biology that he may learn much from the orthodontist. For investigators in orthodontia have recognized the fact, that results in movement were frequently out of all proportion to the amount of force employed. Their studies have lead them far into the study of the stimulation of biologic impulses and of cell activity. We periodontists may very profitably study with them the design and application of the various appliances they use, since these have quite as much effect in arousing tissue stimuli, as have our own present day methods, their biologic reactions. We need to know more of the physiologic principles involved in natural retention, together with a more definite mechanical knowledge of the appliance used for stimulating this desideratum, The stabilization of teeth which have

long been out of occlusal co-ordination, presents a problem which can only be solved by the combined efforts of the orthodontist and periodontist.

Another problem for whose solution the combined efforts of the periodontist and orthodontist is required, is the restoration of normal occlusion in those mouths already subject to advanced periodontal disease. It has already become necessary for the periodontist to seek orthodontic treatment for these cases. And this treatment has been found to be practicable as well as beneficial, even after middle life. Contrary to natural expectation, the correct application of force to teeth having deep periclasial pockets, does not cause irritation, as might be expected, but on the other hand, by reason of its stabilizing effort on the teeth, it stimulates an impulse toward the health of the supporting tissues. This is quite logical in the final analysis, for the influence which produces a biogenetic impulse in the healthy tissues of the adolescent should also produce a similar stimulating effect when applied to the adult tissues, even when these tissues are affected by disease.

Permit me this opportunity therefore, to urge upon the orthodontist a deeper interest in the problems presented in the adult mouth. He may in this way broaden still further the great field in which he is already devoting himself, and at the same time it will extend more widely the scope of the periodontist's services.

These are but a few of the thoughts called forth by this association of our two specialties in this section. The future lies before us as the earth to the miner. An untold wealth of knowledge still remains to be uncovered, and we must dig. Countless additions to science lie just beyond the veil of tomorrow. Shall we not unite more definitely those forces fortuitously brought together and without combined strength set ourselves to the task of wresting from nature the wealth of knowledge which she holds in store for us?

FURTHER STUDIES OF THE EFFECT OF DIET UPON THE TEETH AND JAWS[1]

By PERCY R. HOWE, A.B., D.D.S., Boston, Massachusetts

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

IN PREVIOUS articles (2) we have described effects upon the teeth and their supporting structures that were obtained by feeding vitamine deficient diets. In these reports we have stated that we were unable to obtain any effects upon the teeth of guinea-pigs at the end of a year, according to Miller's theory or thru feeding fermentative foods, altho the flora of the mouth indicated that fermentation of carbohydrates existed continually.

We have further showed that by feeding vitamine deficient diets, decalcification of the teeth occurred even when a sufficient amount of calcium was furnished. The decalcification of the teeth appeared to begin at the tips of the teeth. The occluding surfaces of the molars became matted out thru mastication, forming long horizontal planes. In some teeth detached portions of the enamel adhered to the decalcified dentinal matrix. This enamel eventually crumbled to pieces leaving only the decalcified dentin. The decalcified tissue was readily penetrated by a delicate instrument. Decalcification also occurred between the incisors in some instances. In one animal this appeared as a brown band upon the incisors which seemed like true decay.

We were able in other cases to obtain alveolar destruction with elongation and looseness of the teeth accompanied in some cases by a distinct flow of pus. We have also shown how recalcification of the maxilla may be produced by inserting the vitamines into the diet. Effects upon the eyes, upon growth and upon reproduction, we have mentioned, as well as joint affection and nervous derangements.

In this report we desire to give an account of attempts to determine which group of vitamines produced the most decided effects upon the teeth. Instead of using a large number of animals on usual vitamine deficient diets, we tried to prepare more complete diets and to more carefully control the experiments upon a limited number of animals. We accordingly placed animals in groups of five upon the following diets. Each diet, in so far as the present state of knowledge of these matters permits us to judge, was deficient in respect to one group of vitamines only. These diets were referred to Dr. McCollum and he was kind enough to make some alterations which were adopted and for which we wish to thank him.

Percentage of Scorbutic or Water Soluble "C" Diet

Soy bean	50
Rolled oats to	100
Dried whole milk	10
Yeast	4
Butter	5
Agar	3
Calcium carbonate	2.5
Sodium chloride	1

[1]Aided by a grant from the Research Commission of the National Dental Association.

Soy bean is ground and heated in the autoclave at fifteen pounds' pressure for thirty minutes. The mixture is made into a cracker and dried in the incubator at 37° C. Orange juice was used to furnish the antiscorbutic factor to the controls.

Percentage of Fat Soluble "A" Deficient Diet

Rolled oats	50
White flour to	100
Casein	10
Yeast	4
Lard	5
Agar	3
Calcium carbonate	2.5
Sodium chloride	1

Butter was substituted for lard to the controls.

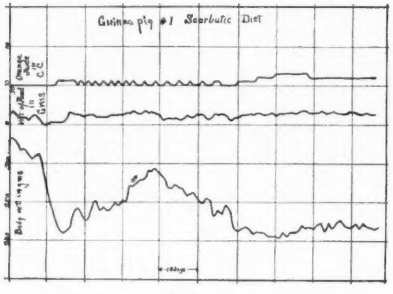


Chart 1

Percentage of Water Soluble "B" Diet

White flour	60
Casein	10
Starch to	100
McCollum's salt mixture No. 185	3.7
Agar	3

Yeast was given to the controls. The amount of food eaten was carefully noted and the animals were weighed daily.

At the end of fourteen weeks, four of the animals in the scorbutic group were chloroformed. Two animals of each group were used as controls. Two of the animals upon the scorbutic diet showed marked decalcification of the teeth. One animal is still alive. In one animal the molars in the lower jaw were decalcified and rubbed off on the

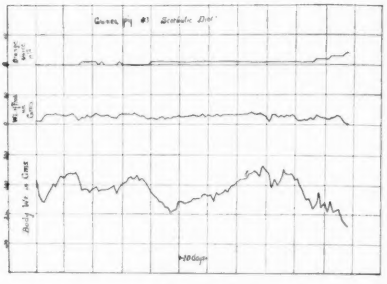


Chart 2

lingual side until the grinding surface was gone, while the opposing molars of the upper jaw were rubbed off buccally. The molars were also malposed and the first molars of the maxilla touched one another across the tongue. The lower incisors had become hollowed out so that a probe could readily be passed into the tooth for a considerable distance. The enamel at the incisal part was thin, trans-

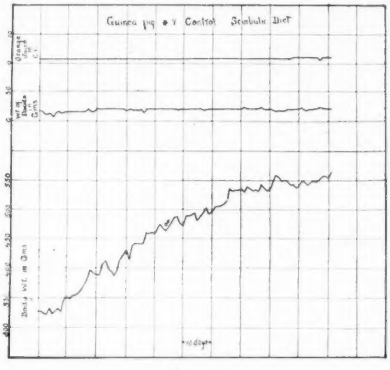


Chart 3

parent and unsupported by dentin. The molars of the other specimen were decalcified, elongated and bent inward across the tongue. The teeth of the controls

were even and appeared unaffected. The jaws were of good size and the bone itself white and firm. During the latter part of this feeding experiment the animals experienced great difficulty in eating.

In both the fat-soluble and water-soluble deficient diets, after a period of sixteen to twenty-six weeks, the macroscopic effects upon the teeth were not nearly as noticeable as those of the animals upon the scorbutic diet. In the fat soluble deficiency, the teeth were short and appeared to be worn down considerably. The enamel also presented areas that were frosted. Whether the lack of gross macroscopic decalcification of the teeth.

While the exact nature of vitamines is as yet unknown, and while possibly these effects may at some time be explained in a different way, it is evident not only from these experiments but from the experiments of many others that they play a part in calcium metabolism. These experiments show that decalcification of the dentin of the teeth of guinea-pigs occurs thru a metabolic disturbance. This condition seems to be similar to caries. In examining human teeth, a zone of transparent dentin is always found ex-

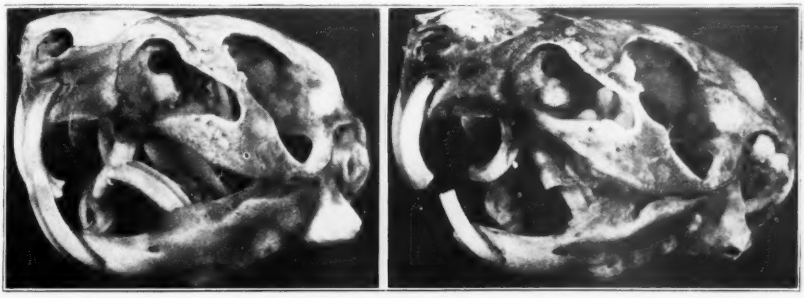


Fig. 1 Fig. 2

Figs. 1-2.—After a scorbutic diet of fourteen weeks. Fig. 1 shows decalcification and disarrangement of teeth; note that enamel is affected at tips of lower incisors and also at the tips of the left molar; other spots are also seen; alveolar process gone. Fig. 2 shows decalcification of the molars; note that this begins at the tip and under mastication molars are beginning to spread out.

marked dental destruction was due to some fault in the preparation of our foods or not, we are not prepared to say. But from our experiments, as so far conducted, we feel that while very probably a lack of any of the three groups of vitamines plays a part in tooth destruction, the part played by the scorbutic group is the most pronounced.

Mrs. Mellanby (3) has given attention to the effect of fat-soluble deficiency, and Zilva (5) to the effect of the anti-scorbutic deficiency. I believe that if Zilva had continued his experiments for a longer period he would have obtained

tending from the pulp cavity to the cavity proper. Examined by polarized light, this shows a crystalline condition; that is, the structure is altered. Miller regarded this as a protective effort against the acids of fermentation. I do not know that he traced this area from the cavity to the pulp chamber, but proper grinding always shows this to exist.

We have shown that *in vivo* these fermentative acids do not effect the teeth of guinea-pigs (twenty). As I have previously stated Miller (4) was unable to produce decay in animals. This transparent zone is well known. Eckermann

(1) gives a great deal of attention to this in his osmotic theory of caries. From studying decalcification *in vitro* and *in viro,* I believe that the calcium of teeth is held in a colloidal-crystalloid combination and that this transparent area is a sign of disintegration of the dentinal structure. From such a point of view calcium loss may occur in a number of ways; exactly how remains to be determined. I have shown many sections of the micro-organisms are not the causative agents. Others have thought derangement of the endocrine glands causes caries of the teeth. It is well known in vitamine studies that these glands are profoundly affected by deficiencies of these food accessory factors.

Again when we attempt to stamp out dental caries by the toothbrush, we can readily see that this at best is but a makeshift procedure. Immediately after a

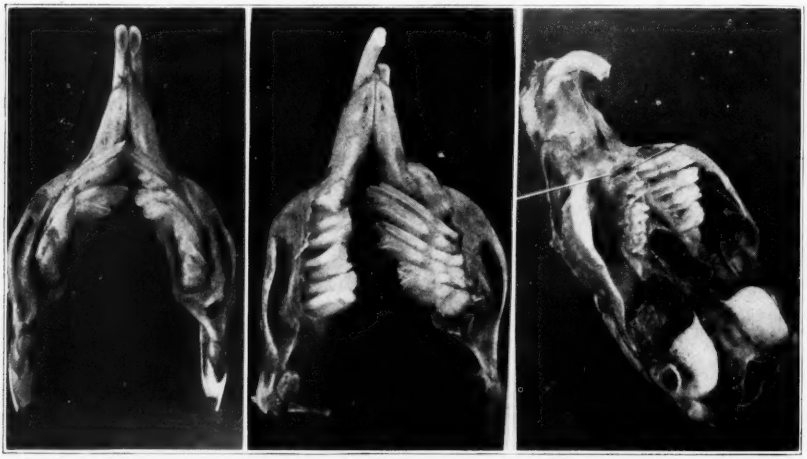


Fig. 3 Fig. 4 Fig. 5

Figs. 3-5.—After fourteen weeks of scorbutic diet. In Fig. 3 the molars are decalcified; more than half of the two posterior molars are rubbed off; teeth are bending across the maxilla; note cavities in central incisors; there is a loss of supporting tissue. In Fig. 4 the molars are extensively decalcified; the supporting tissues are disintegrated. In Fig. 5 the molars are decalcified and readily penetrated by a delicate instrument.

pulpless teeth and of other teeth in which this change has gone on. It is a hyaline condition of the basis substance of the teeth and in bones and in general pathology hyaline tissues are degenerate tissues. Miller remarks that this area lies well in advance of the micro-organisms found in cavities. I have shown elsewhere that feeding micro-organisms isolated from caries produced no effects upon the teeth of experimental animals. I can only conclude that, as in pyorrhea, tooth is cleaned, it is again covered with micro-organisms. From the sixth hour after birth thruout life, the mouth teems with micro-organisms. The dog licks his wounds and no nicer evidence of healing is to be found. Under normal conditions, wounds in the mouth heal with great rapidity. As far as toothbrush treatment goes, it is only those races that have never used a toothbrush who are free from caries; while among those that are constantly using them caries is almost

universal. I am not attempting to decry oral hygiene; on the contrary, I am a hearty exponent of any movement for bodily hygiene. I am however, pointing out that in view of the experiments present here and in previous communications, I feel that this does not reach the actual cause of caries. When we still further consider the dietaries of races that are free from caries and of these communities where it is very prevalent, we need to consider more than the fermentative

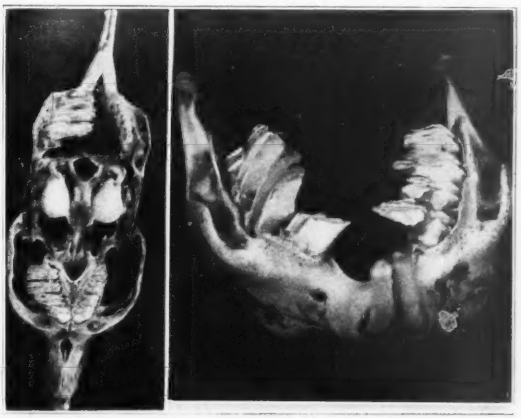


Fig. 6 Fig. 7

Figs. 6-7.—Fig. 6 shows the effect of fourteen weeks upon the scorbutic diet; there is an extensive decalcification of the molars with alveolar loss. Fig. 7 shows the result of vitamine deficient diet; there is a decalcification of molars, half on the right side being gone lingually; on the left side the destructive action may be readily seen with masses of enamel still remaining attached to the decalcified dentin—certainly very similar to caries.

or carbohydrate content of the foods. The races free from caries live on fresh natural foods, unrefined and not too much cooked. These foods contain the vitamines and also a great amount of calcium, both needed for sound teeth, the calcium, for the building of the teeth, the vitamines, to induce proper fixation of the calcium. When people emigrate from regions where they have lived on natural foods to cities, then their teeth decay, coincident with the dietary change. We need, then, milk, eggs, whole grain flour, and in addition to our regular foods, more green leafy foods and uncooked and a variety of foods; soups in which the water of cooked vegetables is utilized.

It is not to be expected that persons will completely change their diets, but when they begin to understand that, in addition to caries, a large sequence of ailments occur as a lack of certain food elements, it would certainly seem that out of regard for their own persons, they would go to some pains to supply the deficiency.

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DISCUSSION

C. E. Woodbury, Council Bluffs, Iowa: I would like to ask Dr. Howe if he has noticed whether inorganic lime is as easily assimilated as organic lime?

Dr. Howe: I do not know. Some experiments were done at the Rockefeller Institute, and it was found that a youngster needs about three times as much lime as an adult, because we have to consider the growing factor. A youngster needs about nine milligrams CaO per kilogram, and this is best retained when three grams of fat is taken for each kilogram. In cases in which not enough calcium was furnished in the diet it was found that if they were fed calcium phosphate it did not seem to be utilized, but when they were fed calcium carbonate it was utilized.

Dr. Woodbury: Would you not have it in milk and cheese?

Dr. Howe: Yes, but that is inorganic, too. In such foods calcium is usually found as phosphate, and two things are involved in holding that in solution: One is CO_2, and the other the colloids. I mean by colloids the materials that will not pass thru an organic filter, such as mucin, albumin, etc. It is the colloids in the thick part of the saliva that play a part in holding the lime in solution.

In this study I have compared the effects of diet on certain of the lower animals, in respect to scurvy. Scurvy has been proved to be the same in man, the guinea-pig and the monkey. I do not say that the teeth act the same as bone. We can decalcify dentin in an animal and can find the definite thing that plays a part in it, and that particular thing is identical in man, monkey and guinea-pig. Much work has been done on the other side. The effects obtained were microscopic rather than macroscopic. But if Zilva had kept his animals over a longer period on the diet he gave I do not see any reason why he would not have obtained just these things.

Weston A. Price, Cleveland: What is the relationship, if any, between the food that is deficient in vitamines, and the resorptive process at the root apex?

Dr. Howe: I do not know. We all know that inorganic metabolism plays a large part. We do know that certain kinds of cartilage planted in an animal will eventually calcify. Dr. Davis has shown how he can cut the bulbous part of a pulp off and new bone will form. It is just a process of calcification. We know that pulp-stones form. We see large exostoses. These are calcifications. We know that calcification may take place in the kidney and gall-bladder, and in many parts of the body. It is this process we are dealing with, and these experiments show that it may be controlled thru diet. The Eskimos, the native Filipinos, the Scotch Highlanders have little or no caries of teeth. As soon as foods which lack the essential elements, reach them a great deal of caries develops. Thru diet we are able to affect the teeth of an animal so profoundly that they completely go to pieces, and it happens to come from the inside of the teeth.

Russell W. Bunting, Ann Arbor, Michigan: Can you produce these same changes in all types of animals? That is, are there certain families of animals that do not show these changes as well as do others, similar to the effect of certain foods upon different types of people?

Dr. Howe: Of course, I really have only worked on the rabbit and also on three or four cats. The reason I judge that at one time Dr. McCollum did not think there was an antiscorbutic vitamine is that I had a lot of this material and he saw the profound error he had made in not thinking there was any antiscorbutic vitamine. He works on the rat, and the rat is not the same as the human at all.

THE EVOLUTION OF PORCELAIN IN DENTISTRY

By HUGH AVARY, D.D.S., San Francisco, California

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

WHEN the lower fusing bodies were first introduced in dentistry the technic was rather vague; inlays were placed in many cavities where they were contra-indicated, the cavity preparation was poor, the colors were not permanent but were easily baked out. And when we look back, it is surprising that any of these restorations were successful. The porcelain was mixed thin with water or alcohol and painted into the matrix—no attempt was made at condensing the porcelain.

A little later the porcelain bodies were improved, the porcelain made higher fusing, with less shrinkage as the result and more permanent colors; some of the pioneers attempted better cavity preparation.

Then, Charles Land of Detroit conceived the jacket crown or inlay, as he sometimes called it, using high fusing bodies.

At first it was customary to make a platinum ferrule or band to snugly fit the tooth, the labial surface of which had been cut thin enough to be burnished in, leaving a depression into which porcelain was baked. This technic, while crude compared to our modern methods, was good at the time it was in vogue, and at least preserved the vitality of the tooth on which it was used.

Then came the three-quarter veneer crown, which was more translucent, as the platinum foil was removed; the objection to it was that in mouths where the stress was great in the protrusive bite, the three-quarter crown was unequal to the task imposed on it, and sooner or later was broken.

Then the *all* porcelain jacket of today came into use, with a better preparation of the tooth and a shoulder cut entirely around the tooth just below the free gum margin. Thus a more nearly equal distribution of force during mastication was obtained. The incisal end of the tooth was cut at about right angles to the stress exerted by the opposing tooth, which made the crown stand up better than before. At first, the tendency was to make a cone of platinum foil 1/1000 to snugly fit the tooth; it was soldered with a tiny piece of pure gold and then burnished directly on the tooth in the patient's mouth; next, a veneer or facing was cut thin and ground to an approximate fit, then it was placed upon the matrix in the patient's mouth with a little porcelain batter. Sometimes a small piece of sticky wax was melted on the lingual side to hold the veneer in position. It was then carefully removed and placed before the door of the furnace and slowly the wax was burnt off, after which it was fired and carried back to the mouth, matrix reburnished, crown removed, porcelain filled in the lingual and approximal sides and the crown again fired. It can be

understood that it was impossible to begin to condense the porcelain on a matrix that is not supported by an amalgam or cement root. A little dry porcelain powder was sprinkled on the tooth and burnished in, so that a dense mass might be obtained, for *even then it was recognized* that the greater the density obtained in packing the porcelain body, the less the shrinkage and the more homogeneous the crown. The jackets on which the veneers were used were not as translucent, the colors were not blended accurately, the jackets often were bulky, and the tooth form was poor.

We have arrived to the indirect technic of today by which it is possible to take an impression of the prepared tooth, a wax bite, and to make up a working model. A platinum foil matrix (1/1000) is made using the tinners lap or lock joint, a cement or amalgam die is made from the modeling compound impression of the tooth, upon which it is possible to condense the porcelain, and with the plaster model to check the alignment and the contact points, the crown could be made without the patient's presence during the entire operation. In different sections of the country, men had their own special method of condensing the porcelain, for it was realized that the closer the molecules of porcelain were to one another, the shorter the distance they would have to jump when the porcelain was in the fused state. The result was a denser, stronger porcelain, with a smoother texture. The reason I object to starch or gum tragicanth in the water used in mixing the porcelain is that when fired the starch or tragicanth, in burning out, leaves minute spaces that it occupied, across which the molecules or grains of porcelain have to jump in the state of fusion. The result is that porcelain in which starch or gum is used shrinks more than will the same porcelain in which only clean or distilled water is used.

Certain men tried to obtain density by pouring the porcelain batter on to the matrix, the porcelain being confined in a paper band wrapped around the technic model of the root. It is possible to secure density by this technic, but there is the haphazard blending of colors. I have seen crowns made this way in which there was a pronounced demarkation of the colors used instead of being a gradual blend, as is the case when the porcelain is applied in layers with a spatula.

Other men were getting good results by ironing or burnishing the porcelain on the platinum matrix, it being supported by the amalgam or cement model root; this method has been almost universally used by porcelain workers for the last few years with no little success. In the hands of a novice the porcelain would often be slightly displaced on the side opposite to the one on which he was burnishing, with the result when fired, that he had a porcelain with cracks in it and often bubbles; the bubbles could be ground thru and filled with porcelain, and the cracks too, and then finished if the porcelain has not been glazed. It was often discouraging to beginners to find their nicely carved crown, when fired, full of cracks. The problem therefore was to get a technic that would enable a novice to get uniform density in his porcelain, so that when it was fired a nice, homogeneous mass of porcelain would be obtained. Since he was unable to accurately blend colors by the pouring technic, he had to discard it as unsatisfactory.

This leads us up to the new technic of condensation that begins where the burnishing or ironing technic ceases (to which I am indebted to Walter G. Hine), namely, to beat or whip the molecules of porcelain into closer relationship with a

sable-hair brush. With this new technic, it is possible to get density and strength in porcelain that are absolutely unobtainable in any other manner.

In teaching jacket crown technic, while I recognize the importance of the accurate blending of colors, that alone is not sufficient. I consider tooth form correctly reproduced to correspond with the patient's own teeth the first and most important consideration, for if the tooth form is poorly restored, but the color good, what benefit is that to the patient if from lack of proper contact points or poorly restored occlusal surfaces and the tooth correctly contoured to protect the investing tissue from the trauma or irritation which would result from the bolus of food during mastication being forced onto the tissues, with the result of receding gums, what does it matter, then, if the color alone is good if the poor tooth form causes such damage as I have pictured? You have doubtless seen jackets in the mouths of patients in which the tooth form was correctly restored according to the requirements of the case, and, altho the color was a little off, the tissue around the gingivae was pink and healthy looking; the jacket itself was so translucent that as a whole it harmonized with the characteristics of that patient's own teeth and the effect was pleasing. I do not wish to convey the impression to you that I do not strive to reproduce the color or hue of the patient's teeth. I only wish to emphasize that the color alone without good tooth form is far from the ideal that can be attained by a careful study of the tooth form in the mouth of each case, before attempting the making of the jacket.

The study of tooth form can be greatly aided by collecting types of extracted teeth, mounting them in either a wax or plaster block, where they may be studied; also by making study models of that particular mouth before attempting the restoration of the tooth with a jacket. We must learn to visualize the tooth minutely, and chart the peculiarities in the form or texture of the enamel on the labial or buccal surfaces of the patient's adjacent teeth, noting the location of spots, defects, development grooves, and embarcation lines and stains that are the individuality of that patient's teeth. When we study minutely the natural teeth, *and only then,* may we hope to give the patient the maximum benefits that he is entitled to and should receive.

Just a few words about the study of colors; most of us are probably aware of the fact that red, yellow and blue are called primary colors or pigments because they form the basis of color mixing and cannot be made by mixtures of other pigments. In jacket-crown work, sometimes two or more colors are mixed and then used; colors are often used by superposition; for example, by using an orange color for the underlying body, and laying over that a blue or gray enamel color. A wide variation of hues or color tones may be made; again by mixing the three primary colors a neutral gray can be made. It is well at this time to consider the effect of light and shade on color; a good way of doing this is to take an orange, place it upon a table so the light will fall on it from one direction; the side toward the light will appear lighter or brighter, while the side away from the light will appear darker or duller. It is really a difficult matter to decide the exact color of the shaded side of any object because so many factors are involved: (1) the natural color of the thing itself; (2) the texture of the surface of the object, whether smooth or rough, shiny or dull, etc.; (3) the intensity and color of the light falling upon the object; (4) the depth or degree of the shade, which increases as the surface is more completely turned away from the light, and as it is farther removed

from other objects capable of reflecting light back to it; (5) the quality and color of the light reflected into the shade from other objects. Bearing these facts in mind, let us consider the orange again. That small portion of the orange upon which the light falls directly, appears quite light, this is termed the *high light.* The light side having a mixture of red and yellow for its local color will need the addition of blue for its shade, making it brownish.

Enough has probably been said of the influence of shade on color, but it is necessary to add something more as to the effect of light in modifying color, and in this connection the texture of the surface is an important factor, for the greater the amount of *light* reflected from the surface, the less the color of the surface can be seen.

This may be well observed by placing side by side two objects, as a common flower-pot (with a dull brick red surface) and a jar of similar earthenware, glazed, or better still, a small pitcher of the same common earthenware partly glazed. It will then be observed that the glazed surface will show spots or streaks of bright, reflected light (images of the window) where the color of the surface is not seen at all. But the dull surface will show its brick red color, tho this will appear much paler where the light falls directly upon it, because its roughish surface reflects a certain amount of scattered white light.

In our color matching of the patient's teeth, it is well to stand several feet away to observe the color from different positions; the patient should keep the teeth wet with saliva, so that we may note the difference in the reflection the lips may make; then the patient should stand so that we may note the color in a conversational distance. We must remember the influence a highly glazed or a fairly roughened texture of the enamel may make; the high light will be modified by the amount of convexity of the surface that is exposed to the light.

I wish to digress a moment to tell of the satisfaction I have had the last year in making my model of the prepared tooth, using Smith's Certified Model Cement. It works nicely and sets so that it may be worked with inside of thirty minutes, and is more than sufficiently strong for making jackets. There is no necessity of waiting overnight, as is demanded in using amalgam models.

Until we as dentists pause to study the harmony of tooth form and color that should exist and be reproduced in every mouth, so that the masticating apparatus shall be able to function as nearly normal as it is possible for it to do, we really fall far short of the result that, in a short time patients will be educated to expect and demand. If we do not keep abreast of the times, we shall soon find ourselves relegated to the things that are *passé,* and be overwhelmed by the avalanche of progress that is sweeping over the profession of dentistry today!

CHILD PSYCHOLOGY IN ORTHODONTIC PRACTICE

By GEORGE F. BURKE, D.D.S., Detroit, Michigan

(Read before the National Dental Association, Milwaukee, Wisconsin, August 15-19, 1921)

A TALENTED surgeon recently made the following statement:

We who carry on hospital work do not make enough effort against suggestion in the case of patients coming into a hospital for the first time.

It is sheer brutality to wheel a conscious patient into an operating room, fully equipped with rows of shining instruments ready to be used in his operation; into sight of white robed and masked surgeons and nurses. It is a brutality that works a lasting damage to the average patient.

If we tried to make the hospital experience as nearly negative as possible, we would slip the patient into the side door of the hospital, as far removed as possible from the hospital sights and smells. We would see that he received a good night's sleep before the operation, which looms before him as a terrible thing, a potential tragedy, and he should be given drugs to induce the sleep if it did not come naturally. We would put him under an anesthetic in his own room, so that he would not be terrified by a sight of the operating room, and its equipment. The psychic results of the operation, under such conditions would be immeasurably less.

The remarks show clearly that he looks at the hospital and the attending staff thru the eyes of his patients. "If you could see yourself as others see you" is an old axiom and one worthy of serious consideration in our practices. Do long white operating gowns in our own office practices suggest blood and surgery? Do cabinets filled with models in plain view of the patients tend to make them feel uncomfortable? Do engines fully exposed in the operating room give children a comfortable feeling on their first visits to the office? Is it desirable to have elaborate displays of equipment in full view of patients? These questions are asked to direct your attention to what is to follow, for while many of us give but little thought to this subject, yet it is worth while and those in professional life are more and more studying this subject.

"Study the Technic of Your Job—But, Above All, Study People" was the heading of a recent article in a well-known magazine. The writer stated further that anyone who understands human nature has an almost infallible recipe for at least a degree of success. Isn't it true that a lawyer, who could recite all the laws on the statute books, but who does not understand human beings, would lose to an opponent who might have far less legal knowledge but who understands how to handle witnesses and jurymen? Doesn't a successful doctor depend as much on his understanding of his patients as he does on what he knows about drugs? Two preachers might write a sermon on the same text: and a congregation would go to sleep over one discourse and be converted by the other simply because one man did not understand the workings of the human heart and mind, while the other one did understand them.

I cannot think of anyone who does not need this understanding. An employer certainly needs it. Bankers are always talking of its importance to them. A salesman would succeed in proportion to

his understanding of the people he has to deal with.

Thousands and thousands of young people are receiving orthodontic attention in this country constantly. It is true that some are under treatment only for comparatively short periods, while others require treatment during a period of several years. One of our big problems is to get these young people to enjoy coming to our office, and in order to do this in many instances it is necessary to study their likes and dislikes, so that we may better understand their thoughts.

Of the various types of children that come to our offices, those that cause us much concern are the defective or precocious youngsters. It is not surprising that we have quite a number that are so afflicted, when one realizes that forty out of one hundred children die before they attain the age of five. It seems that the human family has only a poor understanding of how to rear its children. Young women marry and become mothers without the least knowledge of the essentials of motherhood, either in the matter of pregnancy or after the child has been born. Children are the victims of three causes: inherited defects, environment and circumstance, and ignorant mothers, who do not give them proper care and nourishment.

When we see a thin, nervous body, undersized, and strangely weak, we must remember that danger is ahead. The only hope is in restraint, careful hygiene of the mind and body, and building up of physical strength at all cost. We should be on the lookout for defective and precocious children and do our best to give them the benefit of expert examination and treatment. The reward and comfort that comes to an operator, who has benefited the health of a defective child cannot be measured by the size of a check.

Children occasionally come to our offices under protest and are angry on their first visit. These types are not easy to care for. Anger is hot displeasure due to a sense of injury or wrong. The right kind of anger rightly governed and directed is a powerful instrument for justice and good. The wrong kind may not only work disastrous injury to the object at which it is aimed, but usually exhausts the mind and body and weakens the nervous system.

With children we must keep open the door to the inner life, and understand its emotions. If we want to cure it of bad temper, or prevent it from having bad temper, it is well to understand the cause, the impression produced on the child's mind by the cause, and the line of reasoning by which it proceeds from the cause to the outburst of anger. Then, when we have found the cause and understand the nature of the anger, we must educate the child's will to overcome its tendency and, most important of all, provide some other outlet for utilizing the emotional force in a useful direction.

Where a child for the first time hears its parents discuss the question of orthodontic treatment, the first thought in its mind is, "Does it hurt?" It very frequently happens that they are told by a playmate or member of family or servant that operations upon the teeth do in some cases cause pain. Such statements poured into the ears of a child who is about to undergo treatment causes them in some cases to be afraid on their first visit.

Nothing is more contagious than fear, or more devastating, and it does not seem to matter much whether there is any real reason for it or not. A fear that is made of talk and suspicion appears able to gain as much prestige among children as an actual catastrophe.

Mosso, the Italian author, in his book entitled *Fear* states:

> Every ugly thing told to the child, every fright given him, will remain like minute splinters in the flesh to torture him all his life long.
>
> Anxiety, fear, horror will twine themselves perpetually around the memory like deadly ivy choking the light of reason. At every step we remember the terrors of childhood; the

vaults of a cellar, the dark arch of a bridge, the cross-roads losing themselves in the darkness, the crosses hidden amidst the bushes of a cemetery, a dim light flickering far away in the darkness of night, a lonely cave washed by the waves of the sea, the ruins of an uninhabited castle, the mysterious silence of a deserted tower, breathe out the memory children fear. The eye of the child seems to cast one more look on these scenes from out of the very depths of the soul.

Fear affects the whole nervous system. There is no proof that a mother can communicate to her child an instinctive fear of anything, altho the superstition persists among women. On the other hand, there is no doubt that susceptibility of a child to fear is in considerable degree proportioned to the intelligence it inherits, and there are certain fears that might be classed as common to almost all mankind and others again that are peculiar to certain nationalities.

When a timid and nervous child appears for the first time for treatment and observes a strange man and woman both clad in white garments, cabinets filled with greusome models of other children's teeth, various equipment and appliances, together with the dental engine, with whose music the child is already quite familiar, it seems to me that this scene presents an ideal setting for the child to be overcome with fear.

Children are frequently keen observers. They sometimes estimate us by what they see in the reception room of our office, which should be made attractive. Meaningless pictures should have no place on the walls of our offices. The reception room is quite frequently occupied by children that are not at ease. They fear what is to come. Why not make the walls of our office a valuable asset by having pictures that depict children at their various sports and pastimes. They observe these and their minds follow the suggestions conveyed by them, thereby serving the very useful purpose of getting them interested in other things than pain.

A normal and rational state of mind on the part of these young children is a highly desirable trait for them to have from our standpoint. Let us not leave a stone unturned to do what we can in lessening the psychic results of our office surroundings and operations.

These first visits require much tact. Is it wise to try to accomplish anything on the first visit with timid children? Is it not better to delay until acquaintance is established and a friendship formed?

Children need love; they also need training in controlled action. It takes real friendship to bear with their failures, both intentional and accidental, and guide them quietly and cheerfully along the way. If we can make them feel this sense of friendship and gain their confidence the battle is half won.

Mutual courtesy is the oil which keeps the wheels of friendship running smoothly. The child who is asked or told in a quiet manner to do something responds in like spirit, but a sharp order is an attack upon his self-respect and makes him feel his helplessness before someone bigger and stronger than himself. He should be made to see that we are working with him for his own good, and his response even at times when he sees no reason for our viewpoint will be natural. Let us refrain from issuing commands without taking into consideration that the child has a point of view of his own, which, altho to the adult apparently is not worth while, to the child is a very real issue.

Every child who has a character worth forming has enough individuality to be worth cultivating. Instead of trying to force the mind arbitrarily along one line, let each child know something of the possibilities in various directions and let us help him to choose wisely. Children need discipline and must be taught to submit their will to that of others when right and necessary, but it is bad policy to make them feel antagonism to authority.

Our young friends with whom we came in such intimate contact in our practices

are taking unto themselves more and more the authority which was formerly vested in the parents. In a recent number of the *Atlantic Monthly* is the following:

The power of juvenile opinion is due, not merely to its mass, and to the boldness and unscrupulousness with which it is asserted, but to its reinforcement from outside. It is more than a domestic movement: it is an interdomestic movement. The opinion of the children is thus less provincial than that of domestic adults. It has, furthermore, a force which it derives from its more intimate contact with the main currents of history. The domestic adult is in a sort of backwash. He is looking toward the past, while the children are thinking the thoughts and speaking the language of tomorrow. They are in closer touch with reality, and cannot fail, however indulgent, to feel that their parents and resident aunt are antiquated. The children's end of the family is its budding, forward-looking end; the adults' end is at best, its root. There is a profound law of life by which buds and roots grow in opposite directions.

This new order would be an almost exact inversion of the parental order. Whereas, under the present system, the parents are supposed to control the home for the benefit of the children, providing them with the necessities of life, and giving them work and advice for their own good, under the new system, the children would control the home for the benefit of the parents and other adults, assuming full responsibility for their living, and employing their expert services only as might be required. However difficult it may be to put such a change into effect, there is from the adults' point of view, much to be said for it.

In conclusion, while the literature on the subject of child psychology is extensive and much of it worth reading, Plato over two thousand years ago made a brief statement, which is just as appropriate today as at that time when he said: "The best way of training the young is to train yourself at the same time; not to admonish them, but to be always carrying out your principles in practice."

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Discussion

Frank M. Casto, Cleveland, Ohio: Child psychology is one of the very important questions for consideration by the orthodontist, if he expects to meet with the best success in his practice. The orthodontic treatments and conduct of cases are of such a nature that obviously it is necessary to have the full co-operation and confidence of the child, and co-operation and confidence might be termed or interpreted as the psychology of the child. Without this many of the successful results would be unattainable and would result in almost certain failures.

There are many fundamental principles in the psychology of the child which should be studied by the orthodontist. The application of such principles rests largely with the individual orthodontist. The same thing is true in the use of appliances. For instance, one orthodontist may choose to use one type, while another orthodontist will use an entirely different type of appliances, in order that the same results may be accomplished. I really think the same thing applies in the entire practice of dentistry.

One of the things that I am very careful about in the management of a child is suggestion. I rarely, if ever, say to a child: "Don't do that," because it has been my experience that as soon as the suggestion is made not to do a certain thing, the child immediately has an uncontrollable desire to do that very thing. In other words it is far better to suggest something that the child can do, rather than to call its attention to something it cannot do, or something that you do not wish it to do.

Another important thing for the orthodontist to consider is the character and amount of equipment. The office should not be over-equipped. Most children are very much interested in things mechanical, especially those that are propelled and operated by automatic power, such as electric engines, lathes, sterilizers, running water, etc., and are very likely to start an investigation of them. In such cases it is necessary to replace that thought by a suggestion to do something else. Failure in this might cause the orthodontist to explain and demonstrate to the child the use for that particular appliance.

One of the most satisfactory pieces of equipment that I have in my office, and which has eliminated a number of distressful situations with the children is a Victrola. Practically all children are interested in music, and something of interest can always be found for them in the Victrola records. I might overestimate the value of the Victrola because I really think that it benefits me more than anyone else. It quiets my nerves and makes me feel like fol-

lowing out that oft-repeated suggestion, "keep smiling."

One might discuss the subject of child psychology at great length, but I believe that the whole proposition resolves itself into the question of the individual application of the fundamental principles of psychology. Each person must work out his own salvation.

W. H. Jackson, Ann Arbor, Michigan: I believe the first thing is to get the child's confidence. Get acquainted with them, know their characteristics, know their sensitiveness, and if you find that they are supersensitive and the mother attempts to make them do a thing, say to the mother "I will take care of the child." Tell that child, "I am not going to do anything today, I am just going to look at you. If you don't want me to look at you today come next week and let me look at you then." Nine times out of ten they will tell you that they will come next week. I then keep my word; if I say I will not do anything today I do not do it, even tho the mother or the father demands it. Not long ago a mother almost sent her child into hysterics by trying to force her into the chair. I remonstrated. She said she could not afford to wait. I said to her: "You would give your life for that child; I am going to do something for her but today is not the time." I told the child to come the next week. I just looked at her mouth that time, but the next time she let we do as I wished. You have to be honest with the children. Children realize these things and you can do almost anything after you gain their confidence. I have never had one, no matter how young, who has failed in this.

J. C. Dean, Oakland, California: I feel there is another phase to the question, and that is the moral responsibility of the dentist who comes in contact with the child. An orthodontist particularly, having to do with a case over a given time, from one to five years, has a marked influence on that child's life, either for good or bad. If you are very much rushed with the number of children you take care of after school you are apt to forget your moral responsibility and attend only to those things that are necessary from a professional standpoint. I try to see that each child receives some lesson that will benefit him, other than the professional treatment, each time he comes. Every child has some hobby, perhaps fishing, baseball, wireless telegraphy, or football, and if you inteerst yourself in that and let the child see that you are interested you will help that child. A girl is more interested in the arrangement of her teeth than is the young boy and if you give her a mirror and show her what has been done each time it will help and she will be interested. The boy must be handled differently. If the dentist does not try to drive home some lesson that will help each child he has failed to do his duty as a citizen.

Dr. Burke (closing): I was particularly interested in the idea of claiming the child's attention thru music. It is something new to me. I was also much interested in the remarks regarding suggestion. A number of years ago my sister had some dental work and the story she told me is still very vivid. On one occasion when the work was to be somewhat painful, the doctor gave her some instruction in the use of the violin.

You have all heard of General Baden-Powell, the leader of the Boy Scout movement. The story is told of his being on the street one day when he saw a boy tying a can on a dog's tail. The General, instead of scolding him, interested the boy in tying knots in the rope which he was going to tie on the dog's tail. There is much in this. The *Woman's Magazine* has a department on Child Hygiene which is edited by Professor Rochet of the University of Wisconsin and which has some excellent things in it. Professor Rochet has compiled some one hundred books dealing with this subject and it is restful to read them as a diversion from much of our stereotyped literature.

REPORT OF THE GENERAL SECRETARY TO THE BOARD OF TRUSTEES AND THE HOUSE OF DELEGATES[1]

By OTTO U. KING, D.D.S., F.A.C.D., Chicago, Illinois

To the Members of the House of Delegates and the Board of Trustees of the National Dental Association:

The following report is submitted covering a period of twelve months—July 16, 1920, to July 15, 1921:

State	No. Members 1917.....	No. Members 1918.....	No. Members 1919.....	No. Members 1920.....	No. Members 1921.....	No. Delegates 1921.....
Alabama	198	198	271	246	249	2
Alaska	1	35	...	12	10	1
Arizona	24	18	22	32	42	1
Arkansas	135	104	164	131	96	1
California State	679	504	827	697	953	6
Colorado	295	302	326	370	362	3
Connecticut ...	396	421	388	434	487	3
Delaware	3	4	31	59	38	1
District of Columbia ...	123	118	122	176	204	2
Florida	148	136	179	143	162	2
Georgia	212	269	302	356	321	3
Foreign Members	8	1	...	...	5	1
Hawaiian Islands	...	15	21	22	34	1
Idaho	...	...	6	117	65	1
Illinois 1844	1979	2348	2542	2830	15	
Indiana	973	837	1106	922	1156	7
Iowa	900	903	900	973	958	6
Kansas	440	428	410	472	508	4
Kentucky	354	308	338	341	404	3
Louisiana	123	141	147	240	208	2
Maine	155	144	113	111	197	2
Maryland	210	186	199	219	241	2
Massachusetts..	215	951	1028	1068	1372	8
Michigan	765	788	926	919	978	6
Minnesota	745	870	882	1159	1169	7
Mississippi ...	125	140	159	216	207	2
Missouri	804	746	1069	1048	1035	6
Montana	114	59	144	71	118	2
National Capitol	35	37	40	46	48	1
Nebraska	411	395	421	426	484	3
Nevada	...	1	...	12	...	..
New Hampshire	24	22	15	58	56	1
New Jersey ...	569	567	604	715	835	5
New Mexico...	49	59	70	59	57	1
New York.....1565	1434	1783	1984	2311	13	
North Carolina	291	123	146	269	277	2
North Dakota..	141	4	296	192	163	2
Ohio 1327	1258	1312	1459	1581	9	
Oklahoma	297	278	319	356	349	3
Oregon	184	143	277	177	308	3
Pennsylvania...1443	1091	1447	1672	1861	10	
Philippine Islands	2	1	1	1	4	1
Porto Rico	37	...	1	36	1	1
Rhode Island..	119	128	122	164	154	2
Southern California ..	440	381	508	473	639	4
South Carolina.	177	3	277	155	67	1
South Dakota..	175	158	206	214	208	2
Tennessee	265	218	132	369	408	3
Texas	463	468	551	547	592	4
Utah	116	128	136	142	138	2
Vermont	85	75	66	90	105	2
Virginia	193	210	241	268	265	2
Washington ...	451	503	508	503	475	3
West Virginia..	182	168	221	243	252	2
Wisconsin	695	518	773	1034	920	6
Wyoming	49	21	35	22	65	1
U. S. Army Dental Corps	44	60	351	49	107	2
U. S. Navy Dental Corps	13	14	53	27	13	1
Total 19831	19071	23340	24858	27152		

A summary of the tabulated report shows that the following state societies have made an increase in membership in their 1921 report over that of 1920:

Alabama	3
Arizona	10
Army Dental Corps	58
California State	257
Connecticut	53
District of Columbia	28
Florida	19
Foreign	5
Hawaiian Islands	12
Illinois	288
Indiana	234
Kansas	36

[1]Extracts from the report are preprinted here. The General Secretary's complete report (which has been audited by certified accountants) is published in the *Transactions of the National Dental Association* held at Milwaukee, Wisconsin, 1921. These may be purchased at $1.00 each thru the office of the National Dental Association, 127 N. Dearborn St., Chicago, Illinois.

Kentucky	63
Maine	86
Maryland	22
Massachusetts	304
Michigan	59
Minnesota	10
Montana	47
National Capitol	2
Nebraska	58
New Jersey	120
New York	327
North Carolina	8
Ohio	122
Oregon	131
Pennsylvania	189
Philippine Islands	3
Southern California	166
Tennessee	46
Texas	45
Vermont	15
West Virginia	9
Wyoming	43

We are sorry to report that the table above shows that at the time the books were balanced, the following state societies have decreased in membership:

Alaska	1
Arkansas	35
Colorado	8
Delaware	21
Georgia	35
Idaho	52
Iowa	15
Louisiana	32
Mississippi	9
Missouri	13
Navy Dental Corps	14
Nevada	12
New Hampshire	2
New Mexico	2
North Dakota	29
Oklahoma	7
Porto Rico	35
Rhode Island	10
South Carolina	88
South Dakota	6
Utah	4
Virginia	3
Washington	28
Wisconsin	114

The world-war and conditions which have developed subsequently have affected the National Dental Association very much in the same manner as other organizations. The social and economic unrest still prevails but there seems to be developing gradually a more stable condition of affairs. Notwithstanding these times of unusual political and social unrest in addition to the general dissatisfaction accompanying the high cost of living, it is a great pleasure to be able to report that the various activities of the Association have made an excellent record and that so far as the organization, The Journal and the Relief Fund are concerned, the year has been one of the most satisfactory in the history of our organization.

In 1914, the first year of our organization, we reported 11,883 members while in 1920 we reported a membership of 25,009. Therefore, it is with pleasure that we report an increase of 2,148 members for the year, making a total of 27,157. We are confident that the National Dental Association will close this year with an active membership of 29,000.

THE SECRETARY'S ANNUAL FINANCIAL REPORT

We herewith present an itemized statement of the Secretary's cash book, showing total receipts, and remittances to the Treasurer.

Receipts

Current dues	$53,317.00
Back dues	997.00
Subscriptions	1,969.40
Advertising	57,252.33
Relief Fund	10,769.26
Miscellaneous	1,231.82
Research Commission dues	18,633.00
Research Institute Building Debt	850.00
Local Committee (Boston, 1920)	1,606.91
Total	$146,626.72

Remittances to Treasurer

Dues, advertising, Journal subscriptions, miscellaneous (Remittance Slips Nos. 329 to 362 incl.)		$131,416.22
Journal Fund (Remittance Slip No. 363):		
Bonds	$ 506.89	
	1,000.00	
	1,010.89	
	970.33	
	953.13	
		$ 4,441.24
Relief Fund (Remittance Slip No. 364).		
Certificate of Deposit	$1,786.94	
Bonds	959.58	
	1,010.89	
	1,005.00	
	965.50	
	1,021.11	
	987.11	
	2,660.00	
Check	373.13	
		$ 10,769.26
Total		$146,626.72

A CAREFUL REVIEW OF THE SECRETARY'S AND TREASURER'S REPORTS

THE JOURNAL

The year 1920 will be referred to in the future as the year of high prices, of abnormal profits in nearly every line of business, and of an hysterical condition in which all economic laws were treated as tho they were nonexist-

ent. In our publication department, we were affected by the abnormally high scale of wages and the high cost of paper and of all other materials that go into the conduct of a printing establishment. On the other hand, we were faced with the fact that while the cost of every article purchased was steadily increasing, that which we had to sell—*The Journal*—was remaining stationary so far as our dues and subscriptions were concerned.

In our report last year it was stated that "The Journal has made a good record during the year for the erstwhile contemptuous expression 'a scrap of paper' has been amended to 'dear scrap of paper,' and while the whole world is in desperate straits for a sufficient supply at a greatly increased price, the United States is suffering most of all for this shortage. To illustrate, the same grade of paper that formerly cost us $2,000 a carload today is costing us $8,000 and the cost of envelopes and cover paper has increased proportionately. The expenses in connection with every phase of publishing *The Journal,* including help, etc., has increased 40 per cent during the year."

The present outlook as to the cost of production is uncertain. In February, there was a decrease in the cost of paper stock, approximately equivalent to the last increase—in September, 1920. But thus far the high scale for labor continues.

Quoting from my editorial in the June *Journal,* we say:

"Concerning the increase in the cost of labor the average reader may not know that even during the last two years compositors, press feeders and pressmen have received steadily increasing wages from an average of $27.50 per week up to $50.00 per week at the present time. Bindery workers, machinists, cutters, and workers of every type have had proportionate increases. The astonishing feature is that the Board of Trustees of the American Medical Association has asked for but a 20 per cent increase in the dues when admitting that they think another increase may be required at the Boston meeting, to go into effect in 1922.

"What has occurred in connection with the publication of the *Journal of the American Medical Association* has occurred in the publication of newspapers and periodicals of every type. Increased subscription and advertising rates have been imperative in order to prevent bankruptcy. The National Dental Association is fortunate in having a balance on hand so that at the present time it is possible to meet the increased demands without further increase in the dues.

"The *Journal,* like all other publications, has had to face the high cost conditions, and the National Dental Association will also be threatened with a large deficit unless all officers and the House of Delegates conserve our funds. The keenest and shrewdest business sagacity must be manifested in protecting our treasury against the appropriation of large sums to subsidiary organizations or committees."

ADVERTISING DEPARTMENT

For the fairly satisfactory financial outcome for the year, considerable credit must be given to the Advertising Department. As you probably are aware, until toward the end of the year 1920 there was a very large amount of advertising of all descriptions in all kinds of periodicals. The reason is well known—the income tax. Toward the end of the year, and still more since the first of the present year, there has been a most decided falling off—the excess advertising to which we refer has vanished. These comments apply to periodicals in general but apparently not to the *Journal of the National Dental Association* for thus far our advertising is continuing. The enormous circulation of the *Journal* and the type of men whom it reaches make it an advertising medium of great value to those who want to reach the leading members of our profession. It is needless to say that our advertising standard is still being maintained, and, if anything, the advertising committee is more exacting.

It may be of interest to note that the receipts from dues and subscriptions exceeded those from advertising until this year, when this order was reversed. In 1920 the receipts from advertising were $40,418.66 while the receipts from dues and subscriptions were $51,639.00; whereas the receipts from advertising this year are $57,252.33, and from dues and subscriptions $56,283.40.

While the treasurer's report shows that we have not been able to increase our Journal Endowment Fund, it is gratifying to note that we have held our own. In our opinion, it will be necessary to increase the dues of the National Dental Association as the American Medical Association was compelled to do unless this House of Delegates manifests shrewd business ability in its appropriations. The cash in the treasury plus the amount that we will receive from our advertising department will be nearly sufficient to carry us thru the remainder of the year until we receive the dues of 1922. However, if additional appropriations are made, it will be necessary for the House of Delegates at the same time to seriously consider increasing the National Dental Association dues $1.00. In our opinion, it would be unfortunate to increase the dues at the present time when the slogan of the hour should be "retrenchment and not increased expenses."

RELIEF FUND

The Secretary's office, thru the sale of the Christmas seals, and otherwise, has been able

to secure $10,769.26 for the Relief Fund. The treasurer's report shows a total of $64,975.74 in this fund. In the review of the contributions to this fund by states, we are chagrined to report that many dentists are not enthusiastically co-operating in an endeavor to secure the endowment of $100,000 for relief purposes. Approximately 8,000 are annually contributing to this fund.

FINANCIAL REPORT FOR THE RESEARCH COMMISSION

The Secretary's financial report shows that we have received this year for the Research Commission from dues $18,633.00; for pledges paid on the Research Institute Building Indebtedness $850.00.

LIBRARY

During 1919 we laid the foundation for a great national dental library. We are pleased to report that the success of this undertaking has exceeded our expectation for a large number of very valuable volumes, bound and unbound, have been received during this year. In the course of a few years, our Association will have one of the most complete dental libraries in existence, a library that will be established and maintained with practically no expense to our Association. Our library has already become a clearing-house in co-operating with other dental libraries thruout the United States and foreign countries. Our library is in an excellent position to assist, encourage and maintain an educational spirit relative to all kinds of dental libraries.

ORGANIZATION

The reaction from the altruistic and patriotic motives which controlled actions during the war has had its influence on the esteem in which some dentists hold the principles which have always been the basis of the policies of this Association. One of the dangers which merits the consideration of the House of Delegates is the apparent tendency on the part of certain dentists and a few component societies to be dominated by commercial ideals rather than by the standards which the Association has adopted. A profession has for its prime object the service it can render to humanity. Reward or financial gain should be a subordinate consideration. This subject is presented to the House of Delegates because, as representatives of the organized dental profession, the members of this House are in a position to carry back to the constituent associations and thru these to the component societies influences which shall correct these destructive tendencies.

MEMORIALS AND OPINIONS

The by-laws of the Association provide that no memorial, resolution or opinion of any character whatever shall be issued in the name of the National Dental Association unless it has been approved by the House of Delegates. This places on the House a grave responsibility in formulating the policies of the Association. From time to time, most scientific questions have been brought to the attention of the House of Delegates. It is a serious matter to commit the Association on such questions when the problems have to be determined in the time available during an annual session; and under the present arrangements there is no standing committee to which the House of Delegates may refer such questions for deliberation and a report recommending action. If the House deems it wise, provision might be made so as to make it the function of one of the standing committees—the Judicial Council is suggested because of its relationship to the scientific assembly—to investigate such of these scientific questions as the House of Delegates may refer to it, and to report back recommendations for action.

MOUTH HYGIENE AND PUBLIC INSTRUCTION DEPARTMENT

The Secretary's office, during the year, has endeavored to lay plans that would place our new depatrment, Mouth Hygiene and Public Instruction, on a good financial and practical working basis. We have at the present time over 400 lantern slides, several reprints, charts, etc. In fact, we are endeavoring to carry on a regular propaganda department, which will co-operate with newspapers and other periodicals during the year in giving lectures and in the preparation of papers. I am sure that this department of our organization will continue to justify its existence as a clearing-house for information on the subject of mouth hygiene and public instruction.

Owing to the fact that at the last session of the House of Delegates, the standing committee on Mouth Hygiene and Public Instruction was created, unfortunately there was no time for the appointment of members of this committee and their confirmation by the House of Delegates. This together with the fact that no money has been available for this particular work this year because of large appropriations made to subsidiary organizations, this department, which is of tremendous importance at the present time, has failed to function properly. An active demand continues for pamphlets, books, educational posters and stereoptican slides prepared and issued by this department. Therefore, this standing committee should be thoroly organized and given sufficient funds to properly function during the coming year.

The Secretary has been invited by the President of the American School Hygiene Association to act as chairman of the section on Mouth Hygiene, and also to prepare the program for this section. This meeting will be

held in New York City, November 16, 17 and 18, at the Astor Hotel. In 1922, we are expecting to organize an oral hygiene section as an integral part of the National Educational Association and thus be able to present a real oral hygiene program before this great body of educators.

SUMMARY

We summarize and also list the recommendations contained in this report as follows:

1. Notwithstanding the increased cost of publishing the *Journal* we have greatly improved the *Journal of the National Dental Association* during the past year in cover design, in mechanical make-up and in editorial work. This has been done in view of the fact that large appropriations were made by the House of Delegates last year without affecting our Journal Fund.

2. The *Journal* has grown and developed from a small bulletin to a quarterly journal, from a quarterly journal to a monthly journal which today has the largest paid circulation by thousands of any dental magazine published. The advertising pages in the *Journal of the National Dental Association* command a higher rate than that of any other dental magazine. Expert accountants who have been called in to investigate the assets and good will of the *Journal* report that at the present time it is worth $175,000.

3. Notwithstanding the fact that advertising receipts of other publications have suffered a serious slump, some of them as high as 50 per cent, the *Journal* has been able to increase its receipts to an average of $631 per month, or a total of $7,572 per annum.

THE JOURNAL FUND

It is imperative that the Journal Fund be made permanent and materially increased for it will cost us nearly $90,000 this year to publish the *Journal,* and we receive $54,000 from dues. Therefore, the advertising department must make up the deficit. There may come a lean financial period in our *Journal* work which would necessitate reducing the size of the *Journal* or the number of issues published. To illustrate: immediately following the Boston meeting last year, it was necessary for us to meet outstanding bills for the publication of the *Journal* and paper bills which necessitated an immediate loan of nearly $19,000. This would have been a real crisis to us had it not been for the fact that we had cash on hand in our Journal Fund. This happened during the financial stringency of last year. A large liquid capital must be at all times available for use in connection with the large outlay required in publishing the *Journal.*

4. We have made a net increase in the National Relief Fund of $12,828.08, making a total in the Relief Fund of $64,975.74.

5. The plans for raising $100,000 for Relief Fund purposes has been consummated thru sale of Christmas seals. We now plead for an enthusiastic co-operation from our membership in each state.

6. The Secretary's office has collected during the year $18,633.00 for the Research Commission.

7. There should be a well-organized membership campaign launched in each state in an effort to increase our membership to 35,000 during the coming year. A larger membership will add prestige to our organization in all legislative efforts, publicity campaign and educational work. In fact, it will materially help us in raising the educational status of dentistry.

8. We are of the opinion that during the next fifteen years, ten years will be added on to the life of men, and that mouth hygiene and public instruction will play the most important part in any preventive measures adopted. Hence, the importance of the dental profession visualizing its responsibility and adopting definite plans in order to relieve suffering humanity and continue the leadership in this commendable welfare movement.

9. The Secretary's office has collected a total of $146,626.72 from all sources during the current year.

10. The Secretary has traveled nearly 20,000 miles during the year in the interest of organized dentistry and the *Journal,* particularly the advertising department. He has also presented 129 papers, addresses and talks, and held conferences before various dental organizations.

Two trips were made to Washington in the interest of legislation. On January 14, 1921, the Secretary was invited by the Committee on Ways and Means of the House for a hearing before the committee in reference to tariff legislation affecting dentistry. This hearing was published in Tariff Information of 1922 under Schedule "C," Metals and Manufacturers of, January 14, 1921, Bulletin 8, pp. 927-29.

11. The Secretary desires to announce that owing to the tremendous amount of work involved in secretarial and editorial duties, he has severed all his connections with dental school activities to devote all his time to the National Dental Association work.

Other matters in which the office of the Secretary of the Association has been concerned, namely the report of the Board of Trustees to the House of Delegates, Treasurer's Report, Relief Fund Report, Legislative Committee's Report, Research Commission Report, etc., will be reported to the House of Delegates from other sources.

Reminiscences of Forty-five Years in Dentistry

By C. N. JOHNSON, M.A., L.D.S., D.D.S., M.D.S., F.A.C.D., Chicago, Illinois

Introduction

IT IS with some hesitation that I venture to present these reminiscences to the profession. In the first place to write one's reminiscences might seem to imply a maturity of age and experience wherein one had rounded out one's career, and was ready to step off the stage. To this implication I am unwilling to subscribe. It is true that I occasionally enjoy looking backward, and casting a glance over the "high spots" in my professional career during the period in which I have been associated with dentistry, but for the most part my vision is ahead rather than behind, and I am more interested in the prospect of what is to develop in the future than I am in what has already gone into history.

Then again, to reminisce is to inject a goodly part of one's personality into the situation, and this may easily become so unseemly as to border on egotism. As I look back on my professional career I see so little over which to become egotistical that I should be the last one to invite a charge of this character.

But this is the way the matter came about. The late Dr. Garrett Newkirk, who did much literary work himself, wrote me two years ago that he thought I should put in print my impressions of dentistry during the time I had been connected with it. At first, the idea appealed to me so little that I am afraid I was discourteous enough never even to mention it to him, but somehow the matter gradually began to take form in my mind, and "would not down," till finally I surrendered to the growing impulse, and thru sheer force of habit I picked up a pencil and began working on the manuscript.

Even then I had little idea how far afield I would be carried into the highways and byways of professional experience as I went along, and frankly this series of observations is not in the least what I had planned when the matter first took form in my mind. But such as it is, it must go forth to my fellow-practitioners with the hope that as they follow me they will realize some of the changes that have taken place in dentistry in the past half a century, and particularly that all of these changes have not been for the worse.

I

On August 25, 1875, when just past fifteen years of age, I became indentured to a practitioner of dentistry to take up the study of the profession. At this period the indenture system was in vogue in Ontario where I began, and as I was manifestly too young to think of being graduated at a college, the plan was for me to study with my preceptor for the next five years, and then go to dental school. My duties during those

early years of my professional experience would make a present-day dental student smile—or if he had to assume them himself they would make him weep. I had to sweep and dust the office in the morning, clean the cuspidor between patients, and make myself generally useful—or useless—as the case might be. There was no running water in the office, and the cuspidor had to be emptied in a slop-pail in the laboratory. I can smell that slop-pail yet, and it is not the only odor of that office that I can smell. The stairs were very long, but before you got half way up you would encounter the pungent odor of creosote, phenol (only it was called "kerbolic acid" or "oil of smoke" in those days), coal gas in the winter, when the wind was in the wrong direction, and all the other odors which have a propensity for accumulating around a dental office.

I also did laboratory work and in odd moments I prepared cavities with hand excavators in extracted teeth—of which there were plenty in all country offices. As I recall it there was little attempt at that time to treat and fill pulpless teeth, which proves how perfectly such things go in cycles. Today we are presented with the spectacle of men getting up before dental societies and going on record in print to the effect that it is unsafe to try to retain pulpless teeth—that when the pulp becomes actually exposed the welfare of the patient is best conserved by the extraction of the tooth. When I see theories like that sagely advocated, I am reminded of the practices of half a century ago, and I lament the retrogression which it implies. It is not within the province of the present article to discuss the question of pulpless teeth, but while under the influence of a retrospective mood I cannot quite escape a survey of the numberless pulpless teeth which have come under my own observation during all those years, most of which have served the patients well, and few of which, I am convinced today, have been a serious menace to the health of their hosts. When I think of the "slaughter of the innocents" in those early days I blush for my profession, but I do not blush as much for the men of the early days as I do for those of today who advocate a return to the practices then in vogue. Men had not at that time the facilities at hand to properly care for pulpless teeth, and they were therefore more excusable for sacrificing them. But today with our modern methods of treating these cases, it is almost criminal to advocate the extraction of so many pulpless teeth. The hysteria which has developed over this question is not at all creditable to our calling, and those who are responsible for it, however honest their intentions, have no reason to be proud of their achievement. It goes without saying tho, that this is not an intimation that all pulpless teeth can be saved, nor in the least an argument for the retention of teeth in the mouth which cannot be made healthy by treatment.

My part of the laboratory work consisted chiefly in waxing up, flasking and finishing rubber dentures. There were of course no power lathes in the dental office of those days, and the lathe we used consisted of the stand and wheel of an old sewing machine, on top of which was fastened the lathe head. By the time a denture was properly polished with this rude appliance the foot and leg of the student had received sufficient exercise to develop muscle for future interminable years of standing at the chair and operating.

One mishap, among the many which must have fallen to my lot, stands out in vivid memory. In those days we used mostly for full dentures those grotesque and horribly artificial teeth called gum sections, and one can imagine the infinite time and patience it required to grind the joints of these sections and

pack and vulcanize in such a way that the rubber would not show thru the joints. It was really a triumph when this was accomplished successfully. I had not been long in the office when a full upper denture of this kind was intrusted to my hands to polish. In my ambition to put a high degree of polish on the plate, and not being entirely familiar with the devilish machinations of a polishing brush, I pedaled away with such amazing energy that the brush caught the denture from my hand and landed it with a crash on the floor. I shall never forget the sound of that plate when it hit the floor, and I can see today, as vividly as if it were only yesterday, the great cracks across both of those anterior gum sections. I have had many accidents from that day to this, but none of them has ever impressed me with its enormity as did the fracture of those teeth.

My preceptor endeared himself to me for life by shielding me from the wrath of the patient and hiding the fact that it was I who had done the damage. He merely stated that an accident had happened in the laboratory, and I was such a mere boy that it was never suspected that I was its author.

If I had only been able to realize it at the time there was a wonderful lesson for me in the entire occurrence. I have been trying to learn this lesson ever since, but have never quite accomplished it. The lesson is this: That in the mishaps and misadventures of life, what seems like a mountain today may turn out to be the proverbial molehill tomorrow. As the thing loomed before me at the time, it seemed as if that one terrible blunder must mar my whole professional life. I imagined that I should never be trusted with anything again, that I had made myself unworthy of confidence, and that my position in the profession would always be a mediocre one, if indeed I ever succeeded in becoming a dentist at all. I have many times suffered from the depression of self-abnegation, but never before nor since do I recall having experienced such an utter sense of unfitness for my task. And yet in a few weeks this was gone, and I began to learn the encouraging lesson that I was not only one to blunder, that indeed others more experienced than I made mistakes as well, and that the way to the practice of dentistry was paved by mishaps, and strewn with the wrecks of false beginnings.

Why is it that we cannot learn to look at our experiences in the proper perspective? Why do we constantly worry over trifles, and fume over the unavoidable? Why do we magnify the small things of life till they keep us continually unhappy? Why all this, when in the light of our past experience we have learned the insignificance of much that we fret about and have seen the fleeting character of so many things which we had thought irreparable? I do not know. I know only this, that I continue to worry over things that should never be permitted to worry me.

(*To be continued*)

THE JOURNAL of the NATIONAL DENTAL ASSOCIATION

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IN CHANGES of ADDRESS both the old and new address must be given.

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VOL. 9 JANUARY, 1922 NO. 1

Editorial Department

THE BUDDING YEAR

No one can estimate the possibilities of the year to come. Think of it—we can accomplish whatever we set out to do if our object is a worthy one. And this is a very inspiring thought, one well worth considering. The trouble with most men is that they do not aim high enough, or try hard enough. They content themselves with drifting along the lines of least resistance, and then wonder why they do not attain to greater heights. The beginning of the year is a good time to take stock of one's aspirations and ambitions, and to lay plans for

improvment thru the coming year. Business men take stock of their assets—their commodities. How much more important it is to take stock of one's very self! Instead of becoming too hilarious on January 1, it would be well if man took a rather serious survey of his own status to see wherein he had failed in the past twelve months, and wherein he might succeed in the next. It is an opportune time for this kind of reflection, and every man would be the better for it.

In 1922 the prospects for the dental profession are most promising. There are some of the problems of dentistry which are nearing solution, and every year which solves a problem is a banner year. A more stable status is being approached on the question of focal infection, and the relationship between medical men and dentists is to be clarified and made more effective for a better service of the people. The riot of uncertainty which has clouded this subject during recent years is to be largely dispelled during the coming twelve months. Everything points in that direction.

Then dental society work is to be more energetic than ever and greater good is to result. There never was a time when dental organizations were so active as they are today. Many of the younger men in the profession are coming to the front in association work, and study clubs are being organized and pushed with a vigor and devotion never before known. It is to the young men that we must look for the future development of dentistry, and it is most encouraging to note the interest that is being taken by the new recruits in the better things of the profession. This is particularly true of the advancement in technical procedures. Some of the recent graduates are showing wonderful results in perfecting the technic of modern practice, and it is a most inspiring thing to contemplate. It should always be understood that the older men must never fail to lend a helping hand or say a word of encouragement to the younger men. Out of the fulness thereof is to come the greatest development of the future.

In 1922 dental education is to have a survey which it is hoped will result in much benefit. Colleges are to be inspected with the aim of offering helpful suggestions for betterment, rather than in the spirit of disparaging criticism. All this is most encouraging and it is confidently believed that the result will be a new impetus to dental education in this country.

The western coast section is to receive a splendid incentive to practice better dentistry thru the meeting of the National Dental Association at Los Angeles, July 17-21, 1922, and conversely the dentists of the rest of the country are to be treated to a revelation when they visit the coast and see what marvelous progress has been made in that section, not only by the members of our profession but by the enterprise

of the people generally. The best educator is travel, and the dentists of the eastern and middle states owe it to themselves to journey to Los Angeles and broaden their education.

All in all 1922 promises great things for dentistry. Let each one of us consecrate himself to the effort of making it even more prolific than any one can imagine at the present time. This is the only way to progress—to make each year better than the one before.

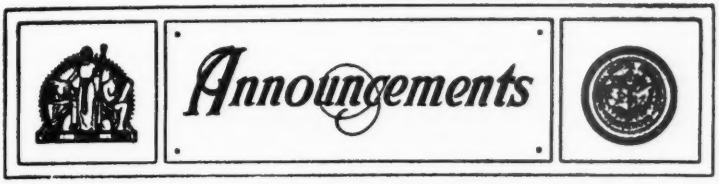
WHAT WILL BE YOUR NEXT CHAPTER?

Another year, filled with momentous happenings, has passed into history, and the world as well as each individual begins a new chapter. The last chapters have been pervaded with tragedy, sordidness, and high idealism. In the spirit of the Disarmament Conference, we should look to the future in anticipation of an exhibition of altruism, which is so unusual in these materialistic times. Life is a great book to which we add a new chapter each year. What have you visualized as the dominant character of your work for 1922?

HOTEL AND RAILROAD INFORMATION TO THE LOS ANGELES MEETING

The beautiful city of Los Angeles, where the next meeting of the National Dental Association will be held, July 17 to 21, 1922, has an unusually large number of hotels. The headquarters for the meeting will be the Ambassador Hotel. The entire program, including the clinics and the exhibits, will be held in this spacious hotel. The various organizations, including the fraternities, have been assigned specific headquarters. This issue of the *Journal* (p. 86) contains a complete hotel directory, railroad rates, and other important information. A "hotel reservation contract" will be found on page 85. It is imperative for those who are contemplating attending this great meeting to fill out this contract and mail it immediately to J. Elton Lang, 707 Auditorium Building, Los Angeles, California.

The report of the Transportation Committee will be found on page 88 of the *Journal*. This committee has sincerely endeavored to present a number of the best routes to Los Angeles. Anyone can easily arrange his own itinerary and cost thereof from this comprehensive report.



CALENDAR OF MEETINGS

NATIONAL SOCIETIES

National Dental Association, July 17-21, 1922, Ambassador Hotel, Los Angeles, Cal. Otto U. King, Secretary, 127 N. Dearborn St., Chicago, Ill.

American Academy of Periodontology, July 10, 11, 1922, Drake Hotel, Chicago, Ill. J. Herbert Wood, Secretary, Cleveland, Ohio.

American Institute of Dental Teachers, third week in January, 23, 24, 25, 1922, at Montreal, Quebec. Abraham Hoffman, Secretary, 381 Linwood Avenue, Buffalo, N. Y.

American Society of Dental Radiographers, January 18, 1922, Drake Hotel, Chicago, Ill. Martin Dewey, Secretary, 501 Fifth Ave., New York, N. Y.

American Society of Orthodontists, April 24, 25, 26, 1922, Edgewater Beach Hotel, Chicago, Ill. Ralph Waldron, Secretary.

STATE SOCIETIES

February

Minnesota, at Minneapolis (22, 23, 24, 25).

March

South Dakota, at Sioux Falls.
Texas, at Houston (13, 14).
Vermont, at Rutland (15, 16, 17).

April

Alabama, at Birmingham (11, 12, 13).
Connecticut, at New Haven (20, 21, 22).
Kentucky, at Louisville (10, 11, 12).
Maryland, at Baltimore (25, 26, 27).
Michigan, at Detroit (10, 11, 12).
Mississippi, at Meridian (18, 19, 20).
Pennsylvania, at Pittsburgh (11, 12, 13).
Tri-State—Oklahoma, Kansas and Missouri, at Kansas City, Missouri (10-15).
West Virginia, at Fairmont (10, 11, 12).

May

Arkansas, at Little Rock.
Illinois, at Springfield (9, 10, 11).
Indiana, at Indianapolis (15, 16, 17, 18).
Iowa, at Des Moines (2, 3, 4).
Massachusetts, Worcester (2, 3, 4).
Nebraska, at Lincoln.
New Jersey, at Trenton, (3, 4, 5).
New York, at Rochester (11, 12, 13).
North Dakota, at Fargo.
South Carolina, at Georgetown.

June

California (Southern), at Los Angeles.
Colorado, at Colorado Springs (15, 16, 17).
Georgia, at Augusta (14, 15, 16).
New Hampshire, at The Weirs (26, 27, 28).
North Carolina, at Wrightsville Beach.
Utah, at Salt Lake City (19-24).
Wyoming, at Sheridan (20, 21, 22).

July

Washington, at Seattle.
Wisconsin, at Milwaukee (11, 12, 13).

September

Delaware, at Wilmington (14).

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

Idaho, at Boise, Bureau of License, January 10, and July 11, 1922. Paul Davis, Director, Bureau of License, Boise.

Tennessee, at Memphis, May 8, 9, 10, 11, 1922. J. Minor, Secretary, Nashville.

STUDY CLUBS AND OTHER SOCIETIES

Alumni Association of the Baltimore College of Dental Surgery, May 30 to June 1, 1922, Emerson Hotel, Baltimore, Maryland. Secretary, Norval H. McDonald, 904 N. Charles St., Baltimore, Maryland.

Alumni Society of the Dewey School of Orthodontia, April 27, 28, Edgewater Beach Hotel, Chicago, Illinois. Secretary, George F. Burke, 741-43 David Whitney Bldg., Detroit, Mich.

New York Society of Orthodontists, February 8, Hotel Vanderbilt, Park Avenue and 34th Street, New York City. Secretary, William C. Fisher, 501 Fifth Ave., New York City.

PENNSYLVANIA STATE DENTAL SOCIETY

The fifty-fourth annual meeting of the Pennsylvania State Dental Society will be held in the Syria Mosque, Pittsburgh, April 11, 12 and 13, 1922. An interesting and instructive program has been arranged. Members holding cards of the National Dental Association from other states are cordially invited to attend all sessions.

W. L. FICKES, *Secretary*,
East End Trust Bldg., Pittsburgh, Pa.

MARYLAND STATE DENTAL ASSOCIATION

The forty-ninth annual meeting of the Maryland State Dental Association will be held at the Hotel Belvedere, Baltimore, April 25, 26 and 27, 1922. An exceptionally good and diversified program will be presented to which members of other state dental societies are cordially invited. Dr. Arthur Lankford, 201 W. Madison St., Baltimore, is chairman of the Exhibit Committee.

For further information apply to
JAMES H. FERGUSON, JR., *Secretary*,
914 N. Charles St., Baltimore, Md.

MISSISSIPPI DENTAL ASSOCIATION

The Mississippi Dental Association will hold its next meeting in Meridian, April 18, 19, 20, 1922.

W. F. BEAVERS, *Secretary*,
Meridian, Miss.

TEXAS STATE DENTAL SOCIETY ANNUAL CONVENTION

The Texas State Dental Society will hold its forty-second annual convention March 13 and 14, 1922, at Houston, Texas. The special features of the program will be lectures and clinic work by Boyd S. Gardner of Rochester, Minnesota, and Carl Hoffer of Nashville, Tennessee, with symposiums and unit clinics by members of the Society. During the four days following, a postgraduate class course will be conducted by Willis A. Coston, Topeka, Kan.; Russell W. Tench, New York City; Arthur E. Smith, Chicago; T. W. Maves, Minneapolis, and Julian Smith, Dallas.

J. G. FIFE, *Secretary*,
1813 Main St., Dallas, Tex.

VERMONT STATE DENTAL SOCIETY

The next meeting of the Vermont State Dental Society will be held March 15, 16, 17, 1922, at the Van Ness House, Burlington, Vermont.

CARTER R. WOODS, *Secretary*,
Rutland, Vt.

THE DENTAL SOCIETY OF THE STATE OF NEW YORK

The Dental Society of the State of New York will hold the fifty-fourth annual meeting at Convention Hall, Rochester, New York, May 11, 12, and 13, 1922. All literary exercises, clinics, and exhibits will be stationed at Convention Hall. Officers' headquarters will be at Hotel Seneca.

The society extends a cordial welcome to all ethical dentists of New York and sister-states. The preliminary program will be issued about April 10 and the official program, May 1. Dentists not members of the state society may obtain programs by addressing the secretary. Make hotel reservations early. Hotels: Seneca, Powers, Rochester, Hayward, etc.

A cordial invitation is extended to exhibitors; address Dr. John J. Scott, 905 Commerce Building, Rochester, New York.

For further information address
A. P. BURKHART, *Secretary*,
89 Genesee St., Auburn, N. Y.

AMERICAN ACADEMY OF PERIODONTOLOGY

The ninth annual session of the American Academy of Periodontology will be held in the Drake Hotel, Chicago, Illinois, Monday and Tuesday, July 10 and 11, 1922.

CLYDE M. GEARHART, *President*,
Washington, D. C.
J. HERBERT HOOD, *Secretary*,
Cleveland, Ohio.

FIRST DISTRICT DENTAL SOCIETY OF MICHIGAN

The following resolution was unanimously passed by the First District Dental Society of Michigan:

WHEREAS, In view of the fact the First District Dental Society has established a reputation thruout the dental world as being composed of men who have given their full share to our profession, and

WHEREAS, In view of the fact that it has always been the aim of this society to encourage and promote the highest professional standards, and

WHEREAS, Believing that the giving of money in return for professional knowledge is not in accordance with the loftiest ideals we maintain, therefore be it

Resolved, That the First District Dental Society shall hereafter consider the paying of fees for the imparting of scientific knowledge as being contrary to our professional ethics and not in keeping with the high ideals we endeavor to maintain.

IDAHO STATE DENTAL EXAMINERS

The examination for dentists will be held on January 10 and July 11, 1922, at the Bureau of License, Boise, Idaho.

Information and application may be had by writing to

PAUL DAVIS, *Director,*
Bureau of License, Boise, Idaho.

REDUCED FARES TO THE CHICAGO MEETING

The Transportation Committee announces that reduced fares on the basis of one and one-half fare on the certificate plan, have been granted to members of the National Dental Association and dependent members of their families attending this meeting.

This rate applies from all parts of the United States and British Columbia except from Portland or points south thru California and Nevada. The regular tourist rate of $144.26 Chicago and return, good for nine months, is available from these points.

Pay full fare on going trip and get a certificate or receipt when you purchase your ticket. Certificates which show the purchase of tickets January 16-21 inclusive, when validated by joint agent at place of meeting will be honored for return tickets at half-fare, if presented to ticket agent not later than January 25, 1922.

D. C. BACON, *Chairman,*
31 N. State St., Chicago, Ill.

TESTIMONIAL BANQUET FOR DR. A. S. DOWNING

A testimonial banquet will be tendered Dr. Augustus S. Downing, director of professional education, University of the State of New York, by the dental profession, as an expression of appreciation for what he has accomplished for the advancement of professional education.

The banquet will be held at the Astor Hotel on Saturday evening, January 28, 1922. All ethical members of the profession are cordially invited to attend. A formal invitation will be mailed by the secretary, L. M. Waugh, 576 Fifth Avenue, New York City, on request.

THE NATIONAL ALUMNI ASSOCIATION OF THE BALTIMORE COLLEGE OF DENTAL SURGERY

A meeting of the graduates of the Baltimore College of Dental Surgery was called for November 30 at the Baltimore College of Dental Surgery for the purpose of organizing an alumni association. This meeting was well attended and it was decided to hold a meeting the first part of June, 1922, in Baltimore, at which meeting papers will be read and clinics given by graduates of the College. In order to organize this association, officers were elected as follows: president, James H. Ferguson, Jr., Baltimore, Md.; first vice-president, Frank P. Duffy, River Point, R. I.; second vice-president, C. H. Frink, Jacksonville, Fla.; third vice-president, Paul R. Stillman, New York, N. Y.; secretary, N. H. McDonald, Baltimore, Md.; treasurer, G. V. Milholland, Baltimore, Md.; executive committee, W. G. Foster, chairman, Baltimore, Md.; B. L. Brun, Baltimore, Md.; E. Hoffmeister, Baltimore, Md.

It is hoped that graduates of the College, wherever they may be, will be interested in forming an alumni association and that everyone will plan to make the trip to Baltimore this coming year and meet old friends and classmates.

The headquarters for this meeting, which will open May 30 and extend thru June 1, will be at the Emerson Hotel. Louis Rossman, 829 Park Avenue, Baltimore, is the chairman in charge of reservations and will be very glad to make any reservations that any of the members desire.

NORVAL H. MCDONALD, *Secretary,*
904 North Charles St., Baltimore, Md.

ALUMNI SOCIETY OF THE DEWEY SCHOOL OF ORTHODONTIA

The next annual meeting of this society will be held on April 27 and 28, 1922, at the Edgewater Beach Hotel, Chicago, Illinois. The usual high standard of the meetings of this society will be maintained. All interested in orthodontia are cordially invited to attend these meetings.

GEORGE F. BURKE, *Secretary,*
741-43 David Whitney Bldg., Detroit, Mich.

NEW YORK SOCIETY OF ORTHODONTISTS

The next regular meeting of the New York Society of Orthodontists will be held during the afternoon and evening of Wednesday, February 8, 1922, at the Hotel Vanderbilt, Park Avenue and 34th Street, New York City.

A scientific program including clinics and case reports will begin promptly at four o'clock. Dinner will be served at about six-thirty o'clock and the scientific program continued at the conclusion of the dinner.

Ethical members of the profession, interested in the science of orthodontia are cordially invited to be present.

J. LOWE YOUNG, *President,*
18 W. 74th St., New York City.
WILLIAM C. FISHER, *Secretary-Treasurer,*
501 Fifth Ave., New York City.

TENNESSEE BOARD OF DENTAL EXAMINERS

The next meeting of the Tennessee Board of Dental Examiners will be held in Memphis, Tennessee, on May 8, 9, 10, 11, 1922.

GEORGE L. POWERS, *President,*
Memphis, Tenn.
JOE MINOR, *Secretary-Treasurer,*
Nashville, Tenn.

AUTOMOBILE TRIP FROM SAN FRANCISCO TO LOS ANGELES FOR MEMBERS OF THE NATIONAL DENTAL ASSOCIATION

The dentists of northern California are making plans whereby dentists and their families will be their guests on an automobile trip from San Francisco to Los Angeles, the meeting place of the National Dental Association, July 17-21, 1922. Will all dentists who are planning to accept this kind invitation, which is but another proof of the genial hospitality of the West, kindly send their names to John D. Millikin, Elkan-Gunst Building, San Francisco, before March 1, so that proper transportation arrangements may be made. Requests will be placed in the order of their receipt. For further information address

JOHN D. MILLIKIN
Elkan-Gunst Bldg., San Francisco, Cal.

DENTAL CORPS ORDERS FROM WAR DEPARTMENT

NAVY

Lieutenant Commander G. C. Frazier, orders revoked; acceptance resignation.

Lieutenant De W. C. Emerson, Olympia; to navy yard, Puget Sound, Wash.

Lieutenant L. B. Lipman, uncompleted portion of orders revoked; to navy yard, New York.

Lieutenant F. A. Zastrow, upon discharge from treatment at Fitzsimons General Hospital, Denver, Colo., relieved of all active duty; to home.—*Army and Navy Register,* December 3, 1921.

Lieutenant C. P. Holland, naval training station, Great Lakes, Ill.; to Pennsylvania.

Lieutenant W. J. Rogers, naval training station, Newport, R. I.; to naval training station, Hampton Roads, Va.

Lieutenant H. A. Badger, marine barracks, Paris Island, S. C.; to naval hospital Charleston, S. C.—*Army and Navy Register,* December 10, 1921.

Promotions

James L. Brown, dental surgeon from May 11, 1921.—*Army and Navy Register,* December 17, 1921.

To be dental surgeons: William N. Cogan, Joseph D. Halleck, Marion E. Harrison, Lucian C. Williams, Leon Martin, John W. Crandall, Ernest W. Lacy, Harry W. Blaisdell and Cornelius H. Mack.

To be passed assistant dental surgeons: Robert S. Maxwell, Adolphus R. Gleitsman and Arthur H. Yando.—*Army and Navy Register,* December 24, 1921.

ARMY

Captain Joseph H. Jaffer, having been found by an Army retiring board incapacitated for active service on account of disability incident thereto, his retirement from active service is announced; proceed home.

Captain Thomas M. Page from observation and treatment at Walter Reed General Hospital, D. C., and from assignment and duty at Camp Jackson, S. C., to Fort Barrancas, Fla., for duty.—*Army and Navy Register,* December 10, 1921.

Captain William T. Williams from duty at Camp Knox, Ky., and will report by telegraph to commanding general 8th corps area, for assignment to duty and station.

Captain Alvin D. Dannheisser to sail on transport to depart for Manila, P. I., about April 5.

Resignation by Captain Hooker O. Lindsey accepted.

The following promotion in the Dental Corp of the Regular Army is announced: To be captains: Henry A. Winslow, from November 14, 1921; Ernest F. Sharp, from November 17, 1921, and Clarence R. Benney, from November 21, 1921. Ora J. Cohee, chaplain with the rank of captain.—*Army and Navy Register,* December 17, 1921.

Captains Joseph E. Eden, Herbert E. Guthrie, Emory C. Bardwell, Egbert W. van D. Cowan, Frank A. Crane, Robert C. Craven, Glenn D. Lacey, Ralph O. Leonard, John S. Ross, Melville A. Sanderson, William E. Sankey, Arne Sorum, Harold S. Whitney, Henry A. Winslow, First Lieutenants John C. Burr, Charles E. Callery, Leon A. Jones, Rufus W. Leigh, Clarence C. Olson from duty at medical field service school, Carlisle Barracks, Pa., to Walter Reed General Hospital, D. C., for a course of technical instruction.

Resignation by Captain Howard C. Feyler accepted.—*Army and Navy Register,* December 24, 1921.

The following applicants have accepted appointments in the Dental Reserve Corps: Captain F. M. Foye, Santa Rosa, Cal.; Captain W. B. Garrett, Caruthersville, Mo.; First Lieutenant H. L. Maness, Anderson, Mo.; Captain F. W. Foss, Brockton, Mass.; Captain P. A. Bunn, Providence, R. I.

NATIONAL DENTAL ASSOCIATION

Twenty-sixth Annual Meeting
to be held in

LOS ANGELES, CALIFORNIA, JULY 17 TO 21, 1922

HOTEL RESERVATIONS

In making your reservations for the coming meeting consult the hotel rate-sheet on the next page and fill out in full the blank contract below. Mail the same direct to the hotel you wish to patronize, and a copy of the contract accepted by the hotel will be sent you upon receipt of the attached; also baggage tags for your use.

J. ELTON LANG, *Chairman,*
Committee on Halls and Hotels,
707 Auditorium Bldg., Los Angeles, Cal.

Detach

HOTEL RESERVATION CONTRACT

National Dental Association, Los Angeles, California, July 17-21, 1922

.....Hotel

Los Angeles, Cal.

Name.....

Street.....

City.....State.....

Member.....Association
State

Date.....

Please reserve:

.....Single room.....bath for.....persons.
with or without

.....Double room.....bath for.....persons.
with or without

.....Double room (twin beds).....bath for.....persons.
with or without

.....Suite (two rooms).....bath for.....persons.
with or without

The cost of which will be $.....per day.

I hereby agree to pay for rooms described, from.....
morning or afternoon

of.....to.....unless cancellation is made by July 1, 1922.

Signed.....

List names of all who will occupy rooms with you and give name of state association, if any.

Name.....Member.....Association
State

Address.....

Name.....Member.....Association
State

Address.....

Name.....Member.....Association
State

Address.....

NATIONAL DENTAL ASSOCIATION

Twenty-sixth Annual Meeting

LOS ANGELES, CALIFORNIA, JULY 17 TO 21, 1922

HOTEL RATES

The Committee on Halls and Hotels have secured the following rates per day of the various Los Angeles hotels, which will be in effect at the time of the National Dental Association meeting, July 17 to 21 inclusive:

A

Room, without bath, with running water, containing one single bed, to be occupied by one person.

B

Room, without bath, with running water, containing one double bed to be occupied by one person.

C

Room, without bath, with running water, containing one double bed to be occupied by two persons.

D

Room, without bath, with running water, containing two single beds, to be occupied by two persons.

E

Room with bath, containing one single bed, to be occupied by one person.

F

Room with bath, containing one double bed, to be occupied by one person.

G

Room with bath, containing one double bed, to be occupied by two persons.

H

Room with bath, containing two single beds, to be occupied by two persons.

I

Suite of two rooms, with one bath, to be occupied by two persons.

J

Suite of two rooms, with one bath, to be occupied by three persons.

K

Suite of two rooms, with one bath, to be occupied by three persons (one room containing two single beds and the other room containing a double bed).

L

Suite of two rooms, with one bath, each room containing two single beds, to be occupied by four persons.

M

Additional charge per day for each additional occupant above the ordinary capacity of rooms.

HOTELS	Plan	A	B	C	D	E	F	G	H	I	J	K	L	M
Ambassador	E		$3.00 4.00		$ 8.00	$8.00	Flat rate $10.00 per room with bath, to be occupied by two persons. Nearly all rooms with twin beds.							$5.00
Alexandria	E		3.00	$5.00			$5.00 6.00	$ 7.00 8.00	$ 8.00 10.00 12.00	$10.00 12.00	$12.00 15.00	$15.00 18.00	$20.00 24.00	2.00
Clark	E						4.00 5.00	5.00 6.00	6.00 7.00 8.00	8.00 10.00	9.00 11.00			1.00 1.50
Gates	E		2.00 2.50	3.00 3.50			3.00	4.00	5.00 6.00	6.00	8.00	9.00	10.00	1.00
Hayward	E		3.00	4.00	5.00		4.00	6.00	7.00	8.00	9.00	9.00	10.00	2.00
Rosslyn	E		2.00 2.50	2.50 3.00			3.50 4.00	4.50 5.00	6.00 7.00	7.00 10.00	7.50 9.00	10.00 12.00	12.00 14.00	1.00 2.00

HOTELS	Plan	A	B	C	D	E	F	G	H	I	J	K	L	M
Stowell	E						2.50 4.00	3.50 5.00	5.00 6.00 7.00 8.00		6.00 7.00 8.00 9.00	6.00 7.00 8.00 9.00	7.00 8.00 9.00 10.00	1.50
Trinity	E	$1.50	2.00	3.00	3.50		3.00	4.00	5.00		7.00		8.00	1.00
Abbey	E			2.50			2.50	3.50		5.00	6.50			
Angelus	E			3.50				6.00						
Auditorium	E		1.50 2.00	2.00 2.50			2.50 3.50	3.00 4.00	5.00	5.00 6.00	5.50 6.50	7.50		1.00
Cordova	E		2.00	3.00	3.50	3.50	3.50	4.00	5.00	6.00	7.50	7.50 9.00		1.00
Huntington	E		2.50	3.00		2.50		4.00			7.00			
King Edward	E	1.50	2.00	2.50	3.00	2.50	3.00	3.50	4.00	5.50	6.00	6.00	7.00	1.00
Lankershim	E		2.00	3.00			3.00 4.00	5.00 6.00	7.00	6.00 7.00	8.00 9.00	10.00		1.00
Northern	E		1.50	2.00			2.00	3.00		5.00	6.00			
Savoy	E					3.00		4.00 5.00	5.00	6.00 7.00	7.00 8.00	9.00	10.00	
Stillwell	E					2.00	2.50	3.00	4.00					
Van Nuys	E			3.00	4.00			5.00	6.00			10.50	12.00	
Engstrum	Apt's						3.00	5.00		8.00				
Alvarado	A	4.00	4.50	7.00	8.00			8.00	9.00		12.00	12.00	16.00	3.50 4.00
Leighton	A	4.00 6.00	4.00 6.00	8.00 9.00	9.00 10.00	8.00 9.50	8.00 9.50	11.00 12.00	12.00 13.00	13.00 17.00	15.00 19.00	16.00 20.00	20.00 24.00	3.50

The larger number of rooms are being held for the convention, by the first eight hotels on the foregoing list.

Convention Headquarters
Registration Headquarters for all Fraternities
AMBASSADOR HOTEL

HOUSING HEADQUARTERS

Ambassador Hotel—Official Family
Alexandria Hotel—Delta Sigma Delta Fraternity
Clark Hotel—Psi Omega Fraternity
Hayward Hotel—Xi Psi Phi Fraternity

In making reservations use the hotel contract on page 85, and mail directly to the hotel you desire to patronize.

J. ELTON LANG, *Chairman,*
Committee Halls and Hotels,
707 Auditorium Bldg., Los Angeles, Cal.

FARES AND ARRANGEMENTS AVAILABLE FOR NATIONAL DENTAL ASSOCIATION CONVENTION

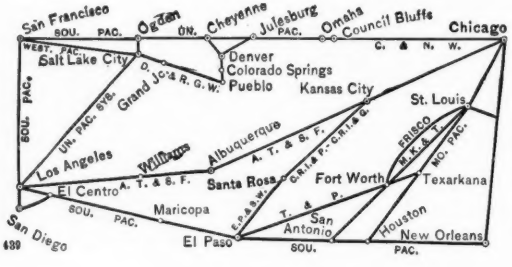
LOS ANGELES, CALIFORNIA, JULY 17-21, 1922

The fares quoted herein are as nearly accurate as can be secured until the final tariffs for 1922 are published, and are approximately correct.

The federal tax of 8 per cent on passenger and Pullman fares will be eliminated after January 1, 1922, making a substantial reduction in transportation charges, and there is a possibility of further reduction in summer fares to the Pacific Coast.

Summer tourist tickets, available for the 1922 convention will be on sale daily May 15, 1922, to September 30, 1922, inclusive, permitting stop-over at any point en route within final return limit of October 31, 1922.

GOING AND RETURNING DIRECT ROUTES



Fare of $106.80 from Chicago will apply via any line to Omaha, Kansas City, or St. Louis and direct lines from those points or from Chicago via any route shown as Nos. 1 to 5 inclusive, returning the same, or any combination of these routes going or returning.

EXAMPLE OF GOING ROUTES FROM CHICAGO

NO. 1

C&NW, CM&StP, CB&Q or CRI&P to Omaha.

Union Pacific to Salt Lake (via Denver or direct).

Union Pacific to Los Angeles.

NO. 2

C&NW, CM&StP, CB&Q or CRI&P to Omaha

Union Pacific to Denver.

Denver & Rio Grande to Salt Lake.

Union Pacific to Los Angeles.

NO. 3

C&NW, CM&StP, CB&Q or CRI&P to Omaha.

Union Pacific to Denver.

Santa Fe Lines to Los Angeles (via Grand Canyon, $9.12 extra).

(Special trains or special car parties cannot be routed via Denver, thence AT&SFe).

NO. 4

Santa Fe Lines to Kansas City.

Santa Fe Lines to Los Angeles.

NO. 5

C&NW, CM&StP, CB&Q or CRI&P to Omaha.

Union Pacific to Denver.

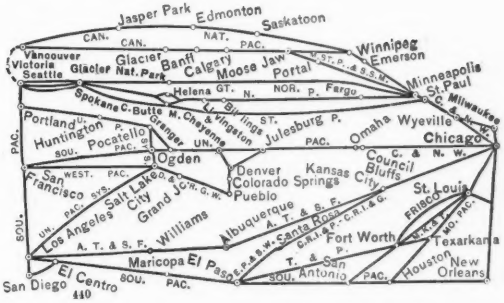
Denver & Rio Grande or Union Pacific Sys. to Ogden or Salt Lake.

Western Pacific or Southern Pacific to San Francisco.

Southern Pacific to Los Angeles.

ONE WAY VIA PORTLAND OR PUGET SOUND POINTS

Fare of $128.40 will apply via any line between Chicago and Omaha, Kansas City, St. Louis, St. Paul, or Minneapolis in connection with direct lines beyond those points. For more detailed information, consult your local ticket agent.



The fare of $128.40 from Chicago will apply going via any route shown as Nos. 1 to 4 inclusive to Los Angeles, Southern Pacific to San Francisco thence via any one of the return routes shown as A to D inclusive. Going via routes Nos. 1 to 4 inclusive, returning via route E will be $13.00 additional including meals and berths on steamer between Seattle and Prince Rupert.

If route No. 5 is used going to Los Angeles via San Francisco, and return trip is via Portland or Seattle, the additional cost will be $17.04. San Diego may be destination of tickets via certain direct routes without additional cost, in other cases may be included as a side-trip from Los Angeles at $7.50.

EXAMPLE OF RETURN ROUTES

ROUTE A

Southern Pacific to Portland.
Union Pacific to Omaha (optional via Denver without additional cost).
Any line to Chicago.

ROUTE B

Southern Pacific to Portland.
Union Pacific to Seattle.
Northern Pacific, Great Northern or Chicago, Milwaukee & St. Paul to St. Paul.
Any line to Chicago.

ROUTE C

Southern Pacific to Portland.
Union Pacific to Seattle.
Canadian Pacific SS Co. or Great Northern to Vancouver.
Canadian Nat'l Rys. to Winnipeg.
Great Northern or Northern Pacific to St. Paul.
Any line to Chicago.

ROUTE D

Southern Pacific to Portland.
Union Pacific to Seattle.
Canadian Pacific SS Co. to Victoria.
Canadian Pacific SS Co. to Vancouver.
Canadian Pacific RR to Portal or Winnipeg.
Soo Line to St. Paul.
Any line to Chicago.

ROUTE E

Southern Pacific to Portland.
Union Pacific to Seattle.
Grand Trunk Pac. SS Co. to Prince Rupert.
($13.00 additional including meals and berths Seattle to Prince Rupert)
Grand Trunk Pac. RR to Winnipeg.
Great Northern or Northern Pacific to St. Paul.
Any line to Chicago.

PULLMAN RATES

Sleeping-car fares from Chicago to Los Angeles including surcharge will be as follows: lower berth, $23.63; upper berth, $18.90; section, $42.53; compartment, $66.75; drawing room, $84.00. These fares will be slightly higher where stop-overs are made.

Rates from Points East of Chicago

Correspondingly low fares will be made from points east and south of Chicago under the same conditions as those applying from Chicago. From principal points approximately as follows:

	Direct Routes	One Way via Portland
Boston, Mass.	$174.33	$195.93
Baltimore, Md.	156.75	178.35
Buffalo, N. Y.	140.76	162.36
Cleveland, Ohio	128.97	150.57
Columbus, Ohio	126.64	148.24
Cincinnati, Ohio	123.65	145.25
Detroit, Mich.	124.43	146.03
Dayton, Ohio	123.65	145.25
Indianapolis, Ind.	117.48	139.08
New York, N. Y.	165.61	187.21
Portland, Me.	182.17	203.78
Philadelphia, Pa.	159.78	181.38
Pittsburgh, Pa.	137.14	158.74
Toledo, Ohio	121.95	143.55

Fares from principal points west of Chicago will be approximately as follows:

	Direct Routes	One Way via Portland
St. Paul, Minn.	$105.00	$117.90
Minneapolis, Minn.	105.00	117.90
Des Moines, Iowa	96.60	118.80
Omaha, Neb.	87.60	116.10
Kansas City, Mo.	87.60	116.10
St. Louis, Mo.	101.40	123.00

Side-Trips

Rocky Mountain National Park (Estes Park) side-trip made from Denver at a cost of $10.50 including rail and automobile transportation.

Grand Canyon, Arizona, side-trip from Williams, Arizona, on Santa Fe Railroad, at a cost of $9.12.

Yosemite National Park side-trip from Merced, California, on Valley Line of Southern Pacific, via Yosemite Valley R. R., Merced to El Portal, thence via auto to Yosemite Valley (Sentinel Hotel) at cost of $13.50 including rail and automobile transportation.

Yellowstone National Park, side-trip from Ogden or Salt Lake at cost of $71.70 via Union Pacific to West Yellowstone, including automobile transportation for complete tour of Park and hotel accommodations for regular four and one-half days' trip. If permanent camp accommodations are used instead of hotels, rate is $9.00 less. Yellowstone National Park side-trip may also be made from Livingston, Montana, on Northern Pacific Railroad at cost of $57.92, via Northern Pacific to Gardiner, including automobile transportation and hotel accommodations for regular four and one-half days' tour thru the Park. If camps are used instead of hotels the rate is $9.00 less.

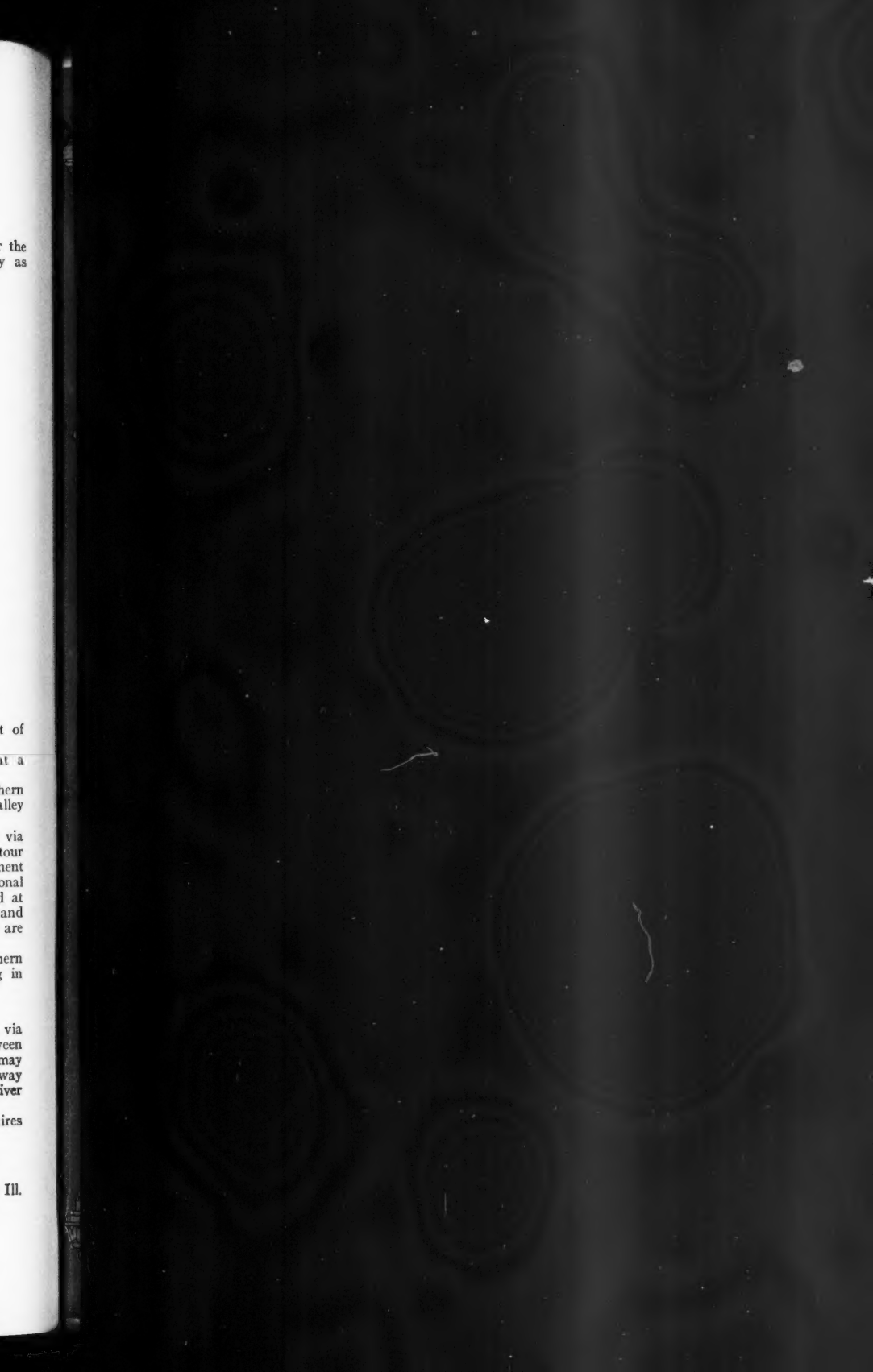
Glacier National Park is reached from Glacier Park Station on the Great Northern Railroad. One-day to seven-day trips may be arranged at Glacier Park Station, ranging in price from $3.50 to $37.00.

Alaska

Side-trip may be made from Seattle, Victoria or Vancouver to Skagway, Alaska, via Canadian Pacific Steamship Company at fare of $80.00 (including meals and berth between Vancouver and Skagway). This is a ten-day trip allowing two full days in Skagway and may be extended from Skagway to Lake Atlin and return for $50.00 additional, or from Skagway to Dawson and return at $115.00 additional, including meals and berths on lake and river steamers.

Lake Atlin trip requires one week's time from Skagway and Dawson and return requires two weeks additional.

TRANSPORTATION COMMITTEE,

D. C. Bacon, *Chairman,*

31 N. State St., Chicago, Ill.